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ABSTRACT

A study was done of the Lilly Endowment Educational Awards (LEEAs), one type of gift-aid for fulltime undergraduate Indiana residents. In particular the study addressed: (1) who receives LEEAs; (2) how Pell, State of Indiana, and LEEA formulas interact; (3) what happens when LEEAs are combined with all of the other types of gift-aid for a total package; and (4) whether the LEEA program increases college participation, affects school choice, or reduces loan burden. Most of the analysis relied on two data sources: the State Student Assistance Commission of Indiana and the State of Indiana Commission for Higher Education Student Information System. The study found that recipients of Pell and state awards come from families whose income level is well below the median for the state. LEEA recipients tend to come from families whose income is near the median. All three gift-aid formulas interact with each other and with external factors, and in ways that are often not immediately obvious. Due to the common practice of "equity packaging," LEEA and state awards may be viewed as block grants to a school's general scholarship fund. The major effect of the program was reduction of student loan burden. Extensive tables and technical appendixes are included. (Contains 71 references.) (JB)

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Interactions Among Gift-Aid Programs in Indiana

Stephen P. Klein, Stephen J. Carroll,
Jennifer Hawes-Dawson, Daniel McCaffrey

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PREFACE

This report analyzes the Lilly Endowment Educational Award (LEEA) program. This program provides "gift-aid" grants to Indiana residents with financial need who are full-time undergraduate college students in that state. The LEEA program was instituted to increase college participation rates in Indiana.

Although the program operates only in Indiana, the report's findings will interest a broad range of financial-aid officers, policymakers, and foundations that make decisions about strategies to increase college participation and retention rates.

The research described here was supported by a grant from Lilly Endowment Inc. to RAND's Institute on Education and Training. A separate document, prepared as part of this project, describes service programs that are designed to promote participation: Abby Robyn et al., *Programs to Promote College Going Combining Services and Financial Aid,* RAND, N-3581-LE, 1992.

SUMMARY

It is a national goal to provide a college education to every student who has the desire and ability to obtain that education. One major obstacle to achieving this goal is cost. Many students do not have the financial resources needed for tuition, fees, books, room and board, etc. Various programs have been instituted to deal with this problem. The federal government offers subsidized loan and work study programs. Colleges grant tuition and fee reductions (and offer other aid under their discretionary control) to students with financial need.

There also are federal and state need-based "gift-aid" programs. These programs (which combined total about $7 billion annually) provide students with grants they do not have to pay back. The amounts awarded are based on formulas that consider the students' (and/or their parents' or spouses') financial resources. In 1987, Lilly Endowment Educational Awards (called LEEAs) were added to the types of gift-aid Indiana residents could receive if they went to college in that state as full-time undergraduates.

As with the federal Pell grants and Indiana's own need-based grants (hereinafter referred to as "State" awards), the size of a student's LEEA is determined by a *formula* that considers financial need. However, unlike the Pell and State formulas, the size of a student's LEEA is affected by how much that student receives from other formula-based programs as well as the total cost of education at the student's school (including room and board, books, and so on).

By the end of the 1992–93 academic year, the Lilly Endowment will have contributed about $50 million to the LEEA program. These grants constitute about 3 percent of all the gift-aid awarded annually to full-time undergraduate students in Indiana.

PURPOSE

This report has two main purposes: (1) to provide the Lilly Endowment with information that may help it chart the future course of the LEEA program and (2) to provide other policymakers, foundations, and financial-aid officers with a better understanding of the following issues:

1. Who receives LEEAs and how do they differ from students who receive Pell and State awards? Do they come from different income brackets? Are LEEA recipients more or less likely to go to private or public schools?
2. How do the Pell, State, and LEEA formulas interact with each other and external factors? For example, what happens if the State or LEEA programs change their formulas? What are the implications of the Pell program using expected student contribution in its formula?
3. What happens when LEEAs are combined with all of the other types of gift-aid a student might receive to create the student's total gift-aid package? How do the policies that govern this packaging affect who receives LEEAs, Pell, and State awards? What problems do these policies pose for measuring the effects of different gift-aid programs?
4. Did the LEEA program primarily increase Indiana residents' college participation, affect their choice of schools, or just reduce their loan burdens?

The next portion of this summary reviews the major elements of the Pell, State, and LEEA formulas. Subsequent sections describe the major findings and conclusions with respect to each of the four issues above.

GIFT-AID FORMULAS

To facilitate the discussion that follows, the term "tuition" includes fees, and "maintenance" refers to the costs for room and board, books, and other expenses associated with attendance. There are two basic methods for computing "expected parental contribution" (i.e., how much the parents are expected to contribute to their child's education). The State and LEEA formulas use the Congressional Methodology. The Pell formula uses the Pell Grant Index (PGI). Both methods consider parental income, assets, allowable deductions, number of family members in college, and similar factors. The major difference between the two methods is that the PGI is less generous in its allowable deductions and therefore tends to especially favor very low-income households.

The three basic formulas for the 1989–90 academic year were as follows:

$$\text{Pell} = \$2{,}300 - \text{parent contribution} - \text{student contribution}$$

$$\text{State} = 77\% \text{ of (tuition} - \text{parent contribution)}$$

$$\text{LEEA} = 45\% \text{ of (tuition} + \text{maintenance)} - (\text{parent contribution} + \text{Pell} + \text{State})$$

The Pell program uses a complicated award schedule, but the formula above closely approximates this schedule. Also, only the Pell formula considers the student's expected contribution. As will be discussed below, this unique feature of the Pell formula turns out to have significant implications for the LEEA program.

The 1989–90 LEEA formula provided 45 percent of the tuition plus maintenance costs at the student's school minus the student's expected parental contribution, Pell grant, and State grant. This formula was used for students going to public colleges (the private school formula was equal to 50 percent of the public school formula). Only the LEEA formula considers maintenance costs. The 77 and 45 percent figures in the State and LEEA formulas above were employed to "ration" the funds allocated to these programs among all eligible applicants, i.e., to ensure that the total grants awarded did not exceed available funds.

WHO RECEIVES FORMULA AID?

Recipients of Pell and State awards tend to come from families whose income level is well below the median for Indiana. In contrast, LEEA recipients tend to come from families whose income is near this median. For the students who go to a given school, the sizes of their LEEAs are not related to their family's income level. This occurs because family income is not a good proxy for expected parental contribution, and it is this contribution (rather than income) that drives the LEEA formula. Indeed, for LEEA recipients who have the same sized Pell award, there is virtually a perfect relationship between their expected parental contribution and the size of their LEEA grant.

About one-third of the LEEA dollars go to students at private colleges. In contrast, only about 15 percent of in-state, full-time undergraduates go to these schools. Thus, a disproportionately large amount of the LEEA dollars go to private school students. However,

in absolute terms, the bulk of the LEEA dollars go to students at public schools. By comparison, 85 percent of Pell dollars and 55 percent of Indiana state scholarship dollars went to students attending public schools.

HOW DO THE FORMULAS INTERACT?

All three gift-aid formulas interact with each other and with external factors, and in ways that are often not immediately obvious. For example, as we noted above, only the Pell formula considers the student's expected contribution. Because of this feature and the nature of the LEEA formula, almost two-thirds of the LEEA dollars replace the funds the student would have received from the Pell program were it not that Pell considers the student's expected contribution in computing need. This happens because a student who works and saves during high school (and college) has more money to spend on educational costs and therefore does not receive as much from Pell as a student who does not work. By considering the size of a student's Pell award, the LEEA formula makes sure both students receive the same total formula-based gift-aid.

The amount of LEEAs granted in the 1991–92 school year was about 25 percent greater than in the previous year. Our analyses estimate that almost one-third of this surge stemmed from the rationing factor in the State formula being lowered from 77 to 63 percent. Almost half of the increase was attributable to an increase in applications for aid, which in turn may have been related to another Lilly program (called College Goal Sunday). These examples illustrate just some of the ways in which gift-aid formulas may interact with each other and with external factors.

WHO BENEFITS FROM THE LEEA PROGRAM?

Most colleges use various forms of a practice called "equity packaging" to allocate their discretionary dollars. This practice is designed to even out how much of the gap between educational costs and the family's expected contribution is met by gift-aid. In effect, the school uses its discretionary funds to eliminate differences in the total gift-aid received by students with comparable financial need (although schools vary considerably in how they implement equity packaging principles).

Equity packaging applies to all students with financial need at a school. If two students have the same expected student and parental contributions and Pell grants, but one has State and LEEA dollars

while the other does not, then under equity packaging, the school will give more of its discretionary dollars to the latter student so that both students receive the same total amount of gift-aid. Moreover, because the first student has State and LEEA dollars, the school can devote more of its limited discretionary aid to in-state and out-of-state students without such grants, and thereby bring all students up to the school's self-imposed equity level. Thus, LEEA and State awards may be viewed as block grants to a school's general scholarship fund.

A major implication of equity packaging is that all the financial-aid recipients at a school benefit from the infusion of LEEA dollars, not just the students who officially receive them. The extent to which this occurs depends on how much discretionary aid the school awards. The more it grants, the greater the effect of equity packaging (and the smaller the role of any targeting policies inherent in the formula-aid programs). Our analyses suggest that well over half of all LEEA recipients are affected by equity packaging policies.

This situation led us to answer the question of "who benefits from the LEEA program" by examining which *schools* received LEEA dollars. As noted above, over 60 percent of these dollars went to public schools. However, these schools did not receive as many LEEA dollars as would be expected given that 85 percent of the in-state students went to public colleges.

WHAT WAS THE MAJOR EFFECT OF THE LEEA PROGRAM?

The LEEA program could have three possible effects. LEEAs could increase the percentage of Indiana residents going to college in that state. This is the program's primary goal. LEEAs also could provide students with more choice in where they go to school (e.g., they could select a more expensive school). And finally, LEEAs could decrease a student's loan burden. For the reasons discussed below, we believe this latter outcome is where the program had its greatest effect.

Participation Rate

We examined the effects of the LEEAs on participation rates by looking at demographic trends and making projections from past econometric studies. The first approach showed that relative to neighboring states, Indiana had a small increase in participation rates among the age group that would most likely benefit from the LEEA program. However, many other factors besides this program may have produced this increase. Hence, we cannot confidently attribute the small rise in rates to the LEEA program.

Estimates derived from past econometric research project that the LEEA dollars increased participation in the 1991–92 school year by about 350 to 1,300 students. Put another way, the elasticity coefficients from other studies predict that the LEEA program would lead to a small increase in the total number of students going to college.

Although there are very serious concerns about relying on either the demographic or econometric approaches, both strategies suggest that the LEEA program had a positive but small effect on participation rates. However, because of equity packaging, some of those who did attend college because of the LEEA dollars may not have been LEEA recipients.

School Choice

The analysis of program effects on school choice examined how much gift-aid a LEEA recipient would lose if the LEEA program was eliminated and all the remaining gift-aid was redistributed to all of a school's gift-aid recipients under a pure equity packaging policy. This analysis showed that on average, a LEEA recipient would lose less than $150 from the total gift-aid package. Moreover, virtually all the students we interviewed said that if their gift-aid package was reduced by even the full size of their LEEA, then they would meet this shortfall by taking out a larger loan rather than switching to a less-expensive school. None said they would drop out of college.

Taken together, these results suggest that for most students, the LEEA program probably did not have much effect on which schools students attended.

Loan Burden

The foregoing considerations led us to conclude that the probable main effect of the LEEA program was to reduce a student's loan burden (rather than increase participation rates or provide more choice in which school to attend). Such a reduction may be very important to many students because by not having to work for these dollars, they can devote more time to studying and being involved in campus activities.

ACKNOWLEDGMENTS

This project was conducted with the assistance of numerous persons, schools, and agencies throughout Indiana. We are especially grateful to Clyde Ingle and Robert Ruble at the Indiana Commission for Higher Education and to Dennis Obergfell, Eric Jones, and Kathleen White at the State Student Assistance Commission of Indiana for providing us with the data that were used in our analyses. Throughout the project, Natala Hart of IUPU Indianapolis gave us particularly helpful insights and information regarding financial-aid practices in Indiana.

Interviews were conducted with financial-aid officers at the following colleges: Ball State University, Butler University, DePauw University, Indiana State University, Indiana University (Bloomington), Indiana University (Kokomo), IUPU Indianapolis, Purdue University (West Lafayette), Rose Hulman Institute of Technology, and the University of Indianapolis. We also interviewed several financial-aid recipients at many of these schools. In addition, interviews were conducted with a number of decisionmakers including: John Walls, President of the Indiana Chamber of Commerce; Charles Williams, President of the Indiana Black Expo; Sarah McNabe, Vice President for Student Services from Indiana University Central Administration; and Ed Danamore, Program Director for Indiana University Financial Aid Programs.

Our RAND colleagues Sue Bodilly, Lynn Karoly, Joyce Peterson, Abby Robyn, and Georges Vernez provided many helpful suggestions on drafts of this report, as did William Hall of Applied Policy Research Incorporated and William Bonifield of Lilly Endowment Inc. Linda Weiss and Karin Suede provided skillful assistance in preparing the manuscript.

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1. INTRODUCTION

Making college education widely accessible is a national goal. However, families often do not have the financial resources needed to send their children to college. There are also many adults who want to go college, but cannot afford to given their own and their spouse's savings and income.

Various programs have been instituted to help both the dependent and independent student fill this gap between educational costs and their (and their family's) financial resources, including federally subsidized loans and work study programs. In addition, about 20 percent of all of the full-time undergraduates in the country receive need-based "gift-aid," i.e., money they do not have to pay back (Reeher and Davis, 1991). There are three broad classes of such aid: federal Pell grants, state aid, and funds under the discretionary control of the student's college. The Pell program alone awards about $5 billion annually in need-based aid, states contribute nearly $2 billion more, and colleges often make substantial reductions in tuition and fees to students who cannot afford to pay for the full cost of attendance.

In 1987, Lilly Endowment Educational Awards (called LEEAs) were added to the types of need-based, gift-aid Indiana residents could receive if they went to college in that state. LEEAs are designed to reduce the gap between the costs of attendance and the funds students are expected to receive from parents, Pell grants, and Indiana's own gift-aid program. As with the Pell and Indiana programs, the size of a student's LEEA is based on a *formula* that is tied to financial need. By the end of the 1992–93 academic year, Lilly will have contributed about $50 million to the LEEA program. These grants account for roughly 3 percent of all the gift-aid that is awarded annually in Indiana. Roughly one out of seven full-time, in-state undergraduates received a LEEA.

Although the specific formulas for awarding Pell, State, and LEEAs are well documented in procedures manuals, relatively little is known about how these programs affect each other or the discretionary aid provided by the student's school. For example, do these different sources benefit the same students or do they complement each other? Does the gift-aid a student receives from one source directly or indirectly affect how much is received from some other source?

This report addresses these issues by describing how the Pell, Indiana, and LEEA programs interact with each other and a college's discretionary-aid policies to determine how much gift-aid a student receives. It describes how this interaction affects the targeting policies inherent in the various gift-aid formulas. The report also explores whether the primary effect of the LEEAs has been to increase college participation rates of Indiana residents, to provide Indiana students who would have gone to college anyway with more choice in where they went, or whether LEEAs simply decrease loan burdens which in turn may affect how much they have to work while in college.

The report has two main purposes: (1) to provide the Lilly Endowment with information that may help it chart the course of the LEEA program and (2) to provide other policymakers, foundations, financial-aid officers, and the public with a better understanding of the following issues:

1. What are the characteristics of the students who receive various types of formula-driven, need-based, gift-aid? For example, do most LEEA recipients go to public or private schools? Is the pattern different for recipients of Pell or State awards? Are the LEEA recipients different from those who receive other types of formula-driven gift-aid?
2. What is the relationship between the size of a student's LEEA, Pell, and State grants? How does the size of one award affect other awards? What accounted for some of the large changes in the amount of LEEAs awarded over time?
3. What happens when formula-based aid is combined with the school's discretionary funds to create the student's total gift-aid package? How do the policies that govern this packaging affect targeting LEEAs, Pell, and State awards? Why does this packaging make it difficult to measure the effects of programs (like LEEA) that are designed to increase college participation?
4. Did the LEEA program primarily increase Indiana residents' college participation, affect their choice of schools, or reduce their loan burdens?

We began our studies by examining who receives LEEAs and how the various types of formula gift-aid programs (Pell, State, and LEEA) interact with each other and with external factors. We then investi-

gated how these programs fit into the total gift-aid package (i.e., the package that includes gift-aid from the student's own school and other sources). These activities, which included statistical analyses of state data as well as interviews with financial-aid officers and students throughout Indiana, revealed that many students were affected by the LEEA program even though they were not officially LEEA recipients. At many schools, the LEEA program was essentially a block grant to that school's general scholarship fund. Consequently, the question of "who benefits from the LEEA program" could not be answered by focusing on LEEA recipients. This led us to explore the possible effects of the LEEA program by examining college participation rates in Indiana before and after the LEEA program was implemented.

The next section of this report summarizes the major features of the Pell, Indiana, and LEEA formulas. Section 3 provides information on who received LEEAs and how much they received through this program. Section 4 discusses how LEEAs interact with Pell and Indiana grants (hereinafter referred to as State grants). Section 5 describes how all three types of formula-based aid (Pell, State, and LEEA) are combined with the school's discretionary funds and other awards to create the total gift-aid package a student receives, and the implications of these packaging policies. Section 6 explores the relationship between the implementation of the LEEA program and changes in college participation rates over time. This section also reviews the problems with using the results from past econometric studies to estimate the LEEA program's effect on participation. The final section presents our conclusions.

Our statistical findings relate mainly to the 1989–90 school year because that is the year for which the most complete data were available (see Appendix A for information regarding all the data bases that were used). Except as noted otherwise, all of our analyses are based on data provided by the Indiana Commission for Higher Education Student Information System. Appendixes B through F provide background information and other documentation for the analyses and findings.

2. FORMULAS FOR AWARDING NEED-BASED GIFT-AID IN INDIANA

Three need-based programs—Pell grants, Indiana state grants, and LEEAs—provide gift-aid to Indiana students in accordance with explicit formulas. These formulas use an estimate of how much money a family should be able to pay toward the cost of a college education, although they do this differently. The first portion of this section summarizes the major differences between each formula's method of calculating a family's expected contribution. The remainder of the section describes the three types of formula-based gift-aid programs. Readers already familiar with the major features of these programs may therefore wish to skip to Section 3.

METHODS FOR CALCULATING EXPECTED CONTRIBUTIONS

There are two methods for computing expected parental and student contributions. The Pell Grant Index (PGI) is used for Pell grants. The Congressional Methodology is used for the State and LEEA formulas. Both methods consider parents' income, assets, expenses, number of adults and children in the family, and, most important, how many family members are in college. One major difference between the two procedures is that the Congressional Methodology generally allows larger deductions for living expenses than does the PGI. For example, the PGI allows a dependent student's parents to offset medical/dental expenses that exceed 20 percent of the gross income minus U.S. and state taxes. The Congressional Methodology allows 5 percent of the parents' total pretax income for this expense. As a result of these differences, the PGI tends to especially favor students from very low-income families.

The Pell formula considers the total expected family contribution—parents plus student—as measured by PGI in its computation of need. In contrast, the State and LEEA formulas do not include any measure of student contribution. All three formulas are based on expected rather than actual contributions and are not affected by actual contributions. If a student's parents contribute less than expected, the student does not receive a larger award from a formula-based gift-aid program. Similarly, students do not have their awards reduced if they or their parents contribute more than expected.

THE PELL GRANT PROGRAM

The Pell Grant Program is the largest federal student grant program. In the 1991–92 academic year, it provided over $5.4 billion to more than 3 million students. To receive a grant, a student must demonstrate financial need, be enrolled at least half-time in an eligible undergraduate program at an eligible school or college, and cannot have already obtained a bachelor's degree. An eligible student's Pell grant is based on three factors:[1]

- Cost of education, including tuition and fees, on-campus room and board (or a standard living allowance for off-campus students), and allowances for other costs (such as books, supplies, and transportation).
- Enrollment status, full-time, three-quarters-time, or half-time and whether full- or part-year.
- The parents' and the student's ability to contribute to educational costs as measured by the PGI.

The Pell grant formula is embodied in a set of payment schedules, one for each category of enrollment status, that specify the grant provided to a student with that enrollment status,[2] given the student's educational cost and PGI. Each payment schedule is expressed in the form of two-dimensional matrices in which the columns are $100 PGI intervals and the rows are $100 educational cost intervals. Each cell contains the grant provided to a student whose PGI and educational cost is contained in the intervals corresponding to the cell's column and row. In general, the grants provided to students in a given educational cost interval (row) increase in steps of $100 as the PGI decreases from one interval (column) to the next. The maximum grant provided to students whose educational costs fall into any interval is a specified fraction of the midpoint of the interval. The schedules also reflect a specified maximum and minimum grant, regardless of PGI and educational cost.

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[1]See U. S. Department of Education (1991a) for a detailed discussion of the Pell Grant Program and the computations involved in determining an eligible student's grant.

[2]The schedules for part-time or part-year students specify smaller grants for each combination of educational costs and expected family contribution.

For example, the full-time, full-year schedule for the 1991–92 school year provides that students with a PGI above $2,200 will not be awarded a Pell grant. Students whose PGI is between $2,101 and $2,200 receive the minimum grant of $250.[3] The grant is increased by $100 (i.e., from $250 to $350) for students whose PGI falls into the $2,001–$2,100 interval. Similarly, students whose PGI is in the $1,901–$2,000 interval are given a $450 grant, students whose PGIs are in the $1,801–$1,900 interval are given $550 grants, and so on. In any case, the maximum grant provided to a student is 60 percent of the midpoint of the educational cost interval into which the student's educational costs fall. Thus, the maximum grant provided to students whose educational costs are $2,500–$2,599 is $1,530 (60 percent of $2,550). Similarly, the maximum grant provided to students with educational costs of $2,600–$2,699 is $1,590, the maximum grant provided to students with educational costs of $2,700–$2,799 is $1,650, and so on to the overall maximum provided to any student, regardless of PGI and educational cost, $2,400.

A student's PGI measures what that student's family can be expected to pay for educational costs. For dependent students, it includes expected contributions from parents' income and assets, and the student's and the student's spouse's income and assets. An independent student's family contribution is based on his and his spouse's income and assets.[4]

The calculation of a dependent student's PGI begins with parental gross income. A series of allowances for family size (reflecting basic subsistence costs), income taxes paid, unusual medical/dental expenses, employment expenses, and elementary and secondary school tuition are then subtracted to obtain the parents' discretionary income. An assessment rate, ranging from 11 percent to 25 percent in 1991–92, is applied to the parents' discretionary income to determine expected parental contribution from income. Similarly, a series of allowances, or "asset reserves" to protect a portion of the parents' assets, are subtracted from parental gross assets to determine the parents' ability to contribute to the student's educational costs from their

[3]There are two exceptions to the minimum: Students with educational costs of $2,200–$2,299 and a PGI of $2,001–$2,100 and students with educational costs of $2,300–$2,399 and a PGI of $2,101–$2,200 are given $200 grants.

[4]Variations of the basic PGI formula are used for dislocated workers, displaced homemakers, and certain low-income families. See U.S. Department of Education (1991a) for details.

assets.[5] An assessment rate (5 percent in 1991–92) is applied to the available parental assets to determine expected parental contribution from assets. Finally, the expected parental contributions from income and from assets are summed and then divided by the number of family members in college, to obtain the total expected parental contribution (PC) toward a student's educational costs.

A similar series of calculations is applied to the student's and the student's spouse's own income (assessed at 75 percent in 1991–92) and assets (assessed at 33 percent in 1991–92) to obtain the expected student contribution toward educational costs.

The PGI measure of the expected family contribution equals the sum of the total expected parental contribution and the expected student contributions from income and assets.

Independent students' expected family contributions are based entirely on their own income and assets. The calculations are basically the same as those used to determine expected parental contribution for dependent students.

Because the scheduled grants vary in steps of $100 as students' educational costs or PGIs vary from one $100 interval to the next, the implicit formula cannot be expressed in a simple form. However, for all practical purposes, the grant provided to a student increases as that student's PGI decreases, up to the maximum. The 1991–92 full-time, full-year payment schedule is closely approximated by the function:

$$\text{Pell} = \$250 + (\$2{,}200 - \text{parental contribution} - \text{student contribution})$$

subject to a maximum of either 60 percent of educational costs or $2,400, whichever is smaller.

SEOG GRANTS

The federal Supplemental Educational Opportunity Grant (SEOG) program provides funds directly to colleges so they can give gift-aid to undergraduate students who demonstrate exceptional financial need. Although the SEOG program is *not* formula based, it is discussed here because it is related to the Pell program. Specifically, in awarding SEOGs, schools must give priority to those receiving Pell grants.

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[5]For example, in 1991–92 a family is allowed a reserve of $30,000 of the net value of their home and $25,000 of other nonfarm/nonbusiness assets such as savings or investments.

However, a school cannot provide an SEOG that exceeds a student's need. The program also specifies the maximum grant that can be awarded to any student—$4,000 in 1992.

Within these broad guidelines, schools decide which students receive SEOG funds and the size of those awards. SEOG awards are therefore under the discretionary control of the schools that receive them. Some Indiana schools allocate all of their SEOG dollars to Pell recipients; others give all Pell recipients some minimum SEOG award (such as $100) and then disburse the remainder of their SEOG funds to Pell and non-Pell recipients with financial need.

THE INDIANA HIGHER EDUCATION GRANT PROGRAM

The Indiana Higher Education Grant Program provides need-based grants to Indiana residents attending Indiana postsecondary institutions. In the 1991–92 academic year, this program will provide approximately $50 million in awards to about 36,000 students. To receive a grant, a student must be an Indiana resident, demonstrate financial need, and attend an eligible Indiana college as a full-time undergraduate.

A student's grant equals an adjustment factor times the difference between that student's expected parental contribution according to the Congressional Methodology and the sum of tuition and fees (up to a budget cap).[6] The adjustment factor is used to ration the funds appropriated for the grant program. It had been approximately 0.77 through the late 1980s and into the 1990–91 school year. Grant applications for the 1991–92 school year surged, and, although the appropriation had been increased, the adjustment factor had to be reduced to 0.63. The budget cap for the 1991–92 school year is $5,980.

The Congressional Methodology is the need-analysis methodology prescribed for federal financial-aid programs other than the Pell grants.[7] It uses the same general approach as the Pell Grant Index to compute the amounts students and their parents are expected to contribute to educational expenses, depending on the student's de-

[6]For convenience, the state uses the institution's prior year's tuition and fees to calculate a student's grant.

[7]The Congressional Methodology is used for the three federal campus-based programs—Perkins Loans, SEOGs, and College Work-Study—as well as the Stafford Loan and Income Contingent Loan Programs.

pendent/independent status.[8] A series of allowances are deducted from parental gross income and gross assets to estimate their discretionary income and assets, termed available income and income supplement, respectively. A contribution rate, ranging from 22 percent to 47 percent in 1991–92, is applied to the sum of available income and income supplement to obtain total parents' contribution. The total is then divided by the number of family members in college to obtain the student's parental contribution.

The Indiana State Scholarship Programs use only the parental contribution component of the Congressional Methodology. In sum, the 1991–92 Indiana State grant provided to an eligible student is:

$$\text{State} = 0.63\ (\text{tuition and fees} - \text{parental contribution})$$

subject to a maximum of $3,767—the award provided a student whose tuition and fees are greater than the $5,980 budget cap.

LILLY ENDOWMENT EDUCATIONAL AWARD

The LEEA program is designed to "reduce and equalize the proportion of educational cost that is left to the student after accounting for the contribution of parents and the major governmental grant programs."[9] It provides need-based grants to Indiana residents attending Indiana postsecondary institutions. In the 1991–92 academic year, this program will provide approximately $10.5 million in awards to almost 18,000 students. To receive a grant, a student must be an Indiana resident, demonstrate financial need, and attend an eligible Indiana school as a full-time undergraduate.

For a student attending a public institution, the LEEA grant equals the difference between a specified fraction of his educational cost and the sum of the student's Pell grant, State grant, and expected parental contribution according to the Congressional Methodology. A student attending a private institution is entitled to a LEEA grant half this size, i.e., equal to half the difference between costs and the sum of Pell and State grants and the parental contribution. The minimum grant is $200. Thus,

$$\text{LEEA} = (\text{cost} * \text{LEEA\%}) - \text{Pell} - \text{State} - \text{parental contribution}$$

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[8]See U.S. Department of Education (1991b) for a detailed discussion of the Congressional Methodology and the computations involved in determining a student's expected family contribution.

[9]Hall (1988a), p. II-3.1.

for a student attending a public institution and half that amount for a student attending a private institution, provided that the LEEA exceeds $200.

Educational costs, termed "cost of attendance" in the LEEA program, equal tuition and fees plus a standard maintenance allowance. The maintenance allowance varies by institutional type but not by type of student. It is based upon a dependent student's expected costs. Self-supporting students are allowed the same amount.

The LEEA rationing factor (LEEA%) is the target fraction of costs to be achieved for all eligible students. It has ranged from 0.43 to 0.45 over the life of the LEEA program. When applications for LEEAs for the 1991–92 school year surged, the Lilly Endowment chose to keep the target fraction at 0.44 rather than to adjust it downward to keep program outlays at previous levels. As a result, awards increased dramatically. In prior years, students used approximately 75 percent of the LEEA awards. If that pattern continues into the 1991–92 school year, total outlays for the LEEA program will increase by more than 25 percent from prior levels.

The expected parental contribution used in the LEEA formula is the same as that used in the State grant formula.

In 1988, the Lilly Endowment Supplemental Award (LESA) was added to the basic LEEA program. The LESA program provides an award of $200 to students attending private institutions who do not qualify for a basic LEEA award because their Pell and State grants combined with their expected parental contribution more than cover the target amount of cost, but who would have qualified for a LEEA award had they attended the University of Indiana at Bloomington—the highest-cost public institution in the state.

3. WHO RECEIVES LEEAs

This section discusses the size of the LEEA program relative to other gift-aid programs in Indiana, changes in the number and amount of LEEAs granted over time, the extent to which these LEEAs tended to go to students at public rather than private schools, the relationship of parental income to both the number and size of the LEEA awards, and the strong relationship between expected parental contribution and the amount of a student's LEEA. This information serves as background for the discussions in the remaining sections. It also shows that parental income cannot be used as a proxy for expected parental contribution (as computed by the methods described in Section 2).

LEEAs CONTRIBUTION TO THE TOTAL GIFT-AID PACKAGE

LEEAs account for about 4 percent of all the gift-aid awarded at public colleges in Indiana, and 2 percent of that awarded at private schools in this state. The 2 percent includes the funds awarded to students at private colleges under the LESA program described in Section 2. All the remaining gift-aid comes from Pell grants, State awards, the college's own discretionary funds, and other grants (Table 3.1). Although federal loan and work study programs are subsidized, they do not qualify as *gift*-aid (e.g., loans have to be paid back).

Over the last five years, about 31 percent of the LEEA dollars (and 43 percent of the awards) went to students at private colleges and universities (Table 3.2). In contrast, only about 15 percent of the in-state, full-time students go to these schools. Thus, by this measure, a disproportionately large number of LEEA dollars and awards go to students at private schools. In 1989–90, the allocation of Pell dollars came very close to matching the 15/85 split in the distribution of private/public school students. In that same year, 55 percent of the need-based dollars Indiana granted to individual students went to those who were attending public schools. However, Indiana also provided block grants to its public schools which in turn give a portion of those dollars to their students (usually in the form of reduced tuition). The actual state contribution to public colleges is therefore much greater than 55 percent.

Table 3.1

Percentage Distribution of Gift-Aid in Indiana in the 1989–90 School Year by Source and School Type

Source	Private Colleges ($87 Million)[a]	Public Colleges ($129 Million)	All Colleges ($216 Million)
Formula aid			
LEEA	2	4	3
Pell	11	43	30
State	15	16	16
Discretionary aid			
Institutional	66	27	43
Federal SEOG	3	3	3
Other gift-aid	3	7	5
Total	100	100	100

[a]The $87 million figure does not include all the gift-aid awarded at private schools (see Appendix A). Institutional aid includes private scholarships and grants in addition to the school's own funds.

Table 3.2

Number and Percentage of LEEA Dollars and Awards Going to Students at Public and Private Colleges

	1987	1988	1989	1990	1991[a]	Total
Amount awarded (in $ millions)						
Private schools	1.0	2.3	2.5	2.6	3.6	12.0
Public schools	3.9	4.6	5.5	5.8	7.2	27.0
Total awarded	4.9	6.9	8.1	8.3	10.8	39.0
% to public schools	80	66	69	69	67	69
Number of recipients (in thousands)						
Private schools	2.4	7.0	7.2	7.3	8.0	31.9
Public schools	6.9	7.5	8.8	9.2	10.3	42.9
Total awards	9.3	14.5	16.1	16.5	18.3	74.8
% at public schools	74	52	55	56	56	57

[a]The values for the 1991–92 school year are estimated based on a 77 percent use rate (not all students accept their awards). Totals may not equal the sum of the tabled values because of rounding.

The large increase in awards between 1987 and 1988 stemmed primarily from the addition of the LESA program, which provided more support to students attending private schools (see Section 2). The reasons for the large increase between 1990 and 1991 in both the number and amount of awards granted are discussed in Section 4.

RELATIONSHIP OF FAMILY INCOME TO NUMBER OF AWARDS

The modal LEEA recipient comes from a family whose income is close to the median for Indiana (as measured by the U.S. Census). In contrast, Pell and State grants generally go to students from families whose income is well below the median. These results are presented in Figure 3.1. The vertical line in the middle of each panel of this figure shows Indiana's median family income.

RELATIONSHIPS WITH SIZE OF AWARD

Although Figure 3.1 shows that most LEEA recipients come from middle-income families, the size of a student's award is not related to family income. This occurs because income is only one of several factors that determine expected parental contribution, and it is this expected contribution rather than income that affects the size of a student's LEEA. Figures 3.2 and 3.3 illustrate these relationships with data from Indiana University (IU) at Bloomington.

Figure 3.2 shows that LEEA amounts are driven by the parents' expected contribution. Specifically, after adjusting for the size of a student's Pell award, there is a near perfect correlation between expected parental contribution (on the x-axis) and the size of the LEEA (on the y-axis). The top line is for students who did not receive a Pell award. The bottom line is for those whose Pell award was $500. The line would have the same shape for any other given sized Pell award. This plot, which mirrors those at other schools, shows that once there is control on the size of the Pell award and school attended, the largest LEEAs go to the students with the smallest expected parental contributions.

There is a wrinkle in the relationship between LEEA amount and parental contribution because the size of a student's LEEA depends on that student's State grant which, in turn, depends on the student's parental contribution. For example, in 1989, Indiana students attending IU at Bloomington were eligible for State grants if their parental contribution was less than $1,726. Thus, the relationship

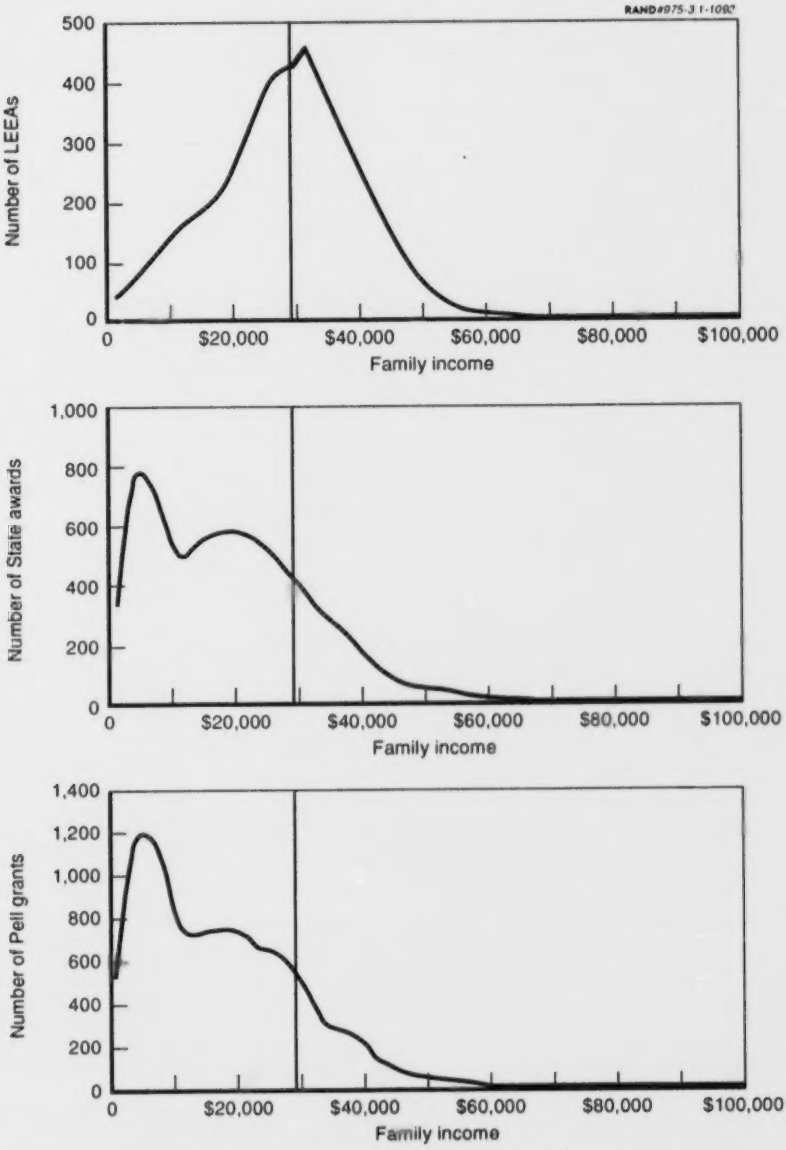

Figure 3.1—Number of LEEA, State, and Pell Grant Recipients in Indiana by Family Income, 1989 (Median Income = $29,000)

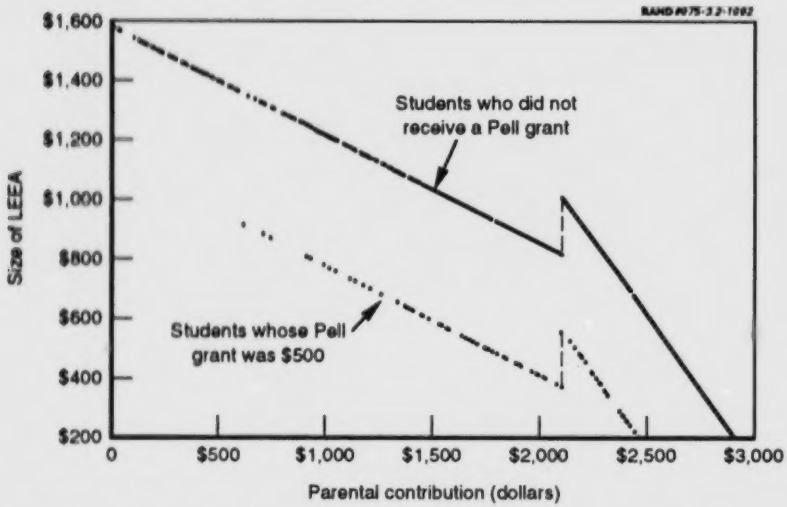

Figure 3.2—Relationship Between Expected Parental Contribution and Amount of LEEA Grant, Indiana University, Bloomington

between the LEEA and parental contribution for IU Bloomington students in 1989 shifts at a parental contribution of $1,726. But, both below and above that figure, the correlation between LEEA and parental contribution is perfect within each level of Pell award.

It is evident from Figure 3.3 that there is no systematic relationship between family income and the size of a student's LEEA. Put another way, parental income cannot be used as a proxy for expected parental contribution. In this figure, family income is on the x-axis and the size of a student's LEEA is on the y-axis. Each plotted point represents one student. The pattern in this figure typifies the relationship between LEEA size and parental income found at other schools in Indiana (the median correlation between income and the amount of the LEEA was 0.02 across the Indiana schools at which there were 30 or more LEEA recipients).

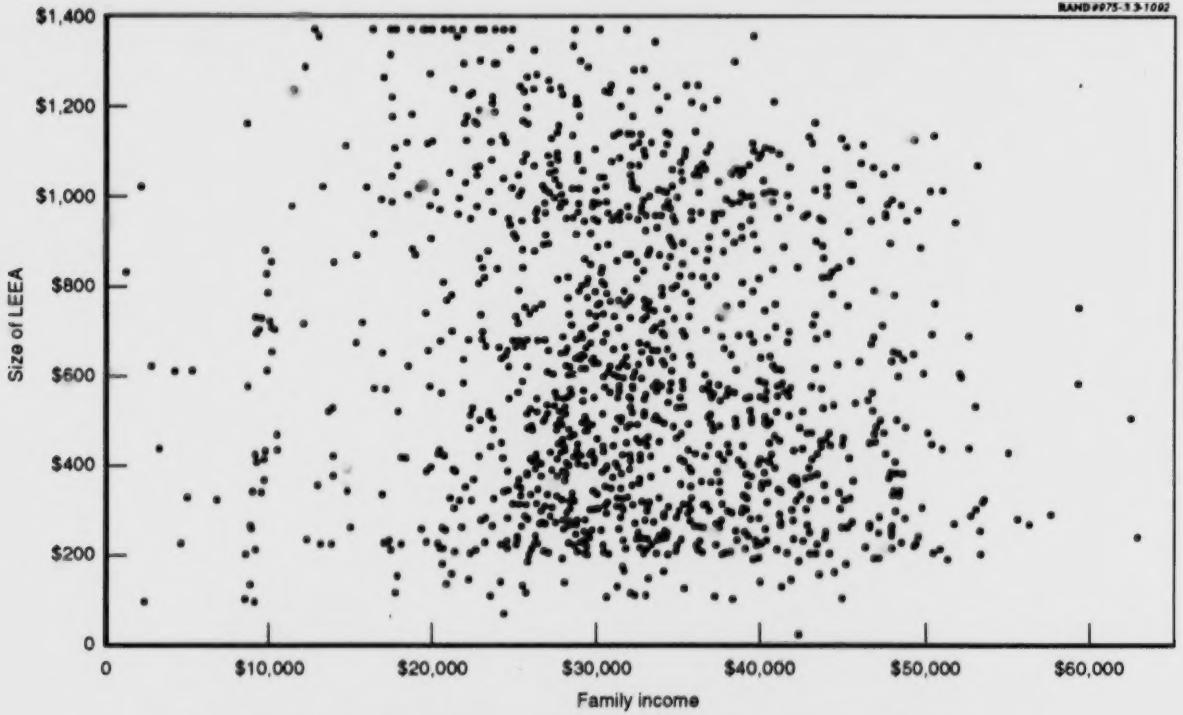

Figure 3.3—Relationship Between Family Income and Amount of LEEA Grant, Indiana University, Bloomington

4. COMBINING LEEAs WITH OTHER FORMULA GIFT-AID

This section discusses how the Pell, State, and LEEA formulas interact with each other in ways that affect LEEA grant sizes and the targeting policies inherent in each formula. We first review the salient features of each formula and then contrast their similarities and differences. Next, we describe how over half of all the LEEA dollars go to replace the funds students would have received were it not that the Pell program uses an expected student contribution factor in its formula. Finally, we explore how the formulas interact with each other and with external factors by examining two specific issues, namely: (1) the relative importance of factors that led to the substantial increase in LEEA awards between the 1990–91 and 1991–92 school years, and (2) what would happen if the LEEA formula was changed so that expected parental contribution (as measured by Congressional Methodology) was replaced with the Pell Grant Index's measure of expected parental and student contribution.

GIFT-AID FORMULAS

To facilitate the discussion that follows, the term "tuition" includes fees, and "maintenance" refers to the costs for room and board, books, and other expenses associated with attendance. Unless noted otherwise, expected student contribution refers to the PGI measure of this contribution plus the generally small net effect of any difference between the PGI and the Congressional Methodology in how they compute expected parent contribution. The three basic formulas for the 1989–90 academic year were as follows:

$$\text{Pell} = \$2{,}300 - \text{parent contribution} - \text{student contribution}$$

$$\text{State} = 77\% \text{ of (tuition} - \text{parent contribution)}$$

$$\text{LEEA} = 45\% \text{ of (tuition} + \text{maintenance)} - (\text{parent contribution} + \text{Pell} + \text{State})$$

The Pell formula above closely approximates the actual Pell grant award schedule (see Section 2). The 1989–90 LEEA formula was 45 percent of the tuition plus maintenance costs at the student's school minus the expected parental contribution, Pell grant, and State grant.

This formula was used with students going to public colleges. The LEEA formula for private school students was equal to 50 percent of the formula for public school students. The values of 45 and 50 were selected by the Lilly Endowment to "ration" the LEEA dollars among those eligible to receive them, i.e., to ensure that the total amount awarded did not exceed available funds. The same rationale led Indiana to select the 77 percent figure for its 1989–90 formula.

SIMILARITIES AND DIFFERENCES AMONG FORMULAS

The Pell program makes awards without regard to the gift-aid available to a student from other sources. Pell grants are therefore independent of any other gift-aid a student receives. The same is true of the State awards. Unlike the State and LEEA formulas, the Pell formula considers expected *student* contribution, i.e., the assets the student is presumably capable of devoting toward the costs of college.

The size of a student's LEEA is directly affected by the size of that student's Pell and State awards. For example, suppose two students go to the same college and have the same expected parental contribution. Suppose further that one of these students has savings from working during high school (or college) and the other does not. According to the Pell formula, the student with the savings receives a smaller Pell award than the other student. The LEEA formula considers how much Pell and State aid the student receives. Thus, all other things being equal, the lower a student's Pell award, the higher the LEEA. As a result of this relationship, a large portion of the LEEA dollars replace the funds the student would have received from Pell were it not for the "expected student contribution" portion of the Pell formula.

EFFECT OF THE PELL FORMULA ON LEEAs

Table 4.1 illustrates how LEEAs are affected by the expected student contribution portion of the Pell formula. The table shows the awards that would be provided by the three gift-aid formulas to each of four hypothetical students. For the purposes of this example, we ignore the differences between the PGI and the Congressional Methodology procedures for computing parental contribution.

Assume that John, Sue, Steve, and Joan are students at the same large, state university. John's expected parental contribution is $2,300; each of the other students has an expected parental contribution of $1,000. John has not accumulated any assets and does not work. Hence, his expected student contribution is $0. Sue, Steve,

and Joan saved during high school and worked during the Summer. Their expected student contributions are $150, $500, and $1,300, respectively.

John's Pell grant is $0 because his expected parental contribution is as large as the maximum Pell grant in this year ($2,300). In addition, because his parental contribution exceeds the $2,100 cost of tuition and fees, his State grant also equals $0. As per the LEEA formula, a student's "target cost of attendance" equals 45 percent of tuition, fees, and maintenance expenses. This target equaled $3,000 at our hypothetical school in 1989–90. Thus, John's LEEA award is $700 ($3,000 – $2,300 = $700).

Sue receives a $1,150 Pell grant. Her State grant of $850 equals 77 percent of the difference between her tuition and fees ($2,100) and her expected parental contribution ($1,000). Sue's LEEA is $0 because the sum of her Pell and State grants and her expected parental contribution exceeds the target cost of attendance.

Steve's Pell is $800 ($2,300 minus his parental and student contributions of $1,000 and $500, respectively). Like Sue, Steve's expected parental contribution of $1,000 results in a State grant of $850. His LEEA of $350 is the difference between the target cost of attendance ($3,000) and the sum of his expected parental contribution, Pell, and State grants.

Joan does not receive a Pell grant because her expected parental and student contributions are larger than the maximum Pell. However, her State grant (which is based on expected parental contribution) is the same as Sue's and Steve's ($850). Finally, her LEEA grant is $1,150.

Table 4.1

How Formula-Aid Programs Interact

	John	Sue	Steve	Joan
Parental contribution	$2,300	$1,000	$1,000	$1,000
Student contribution	0	150	500	1,300
Formula gift-aid				
Pell	0	1,150	800	0
State	0	850	850	850
LEEA	700	0	350	1,150
Total formula aid	700	2,000	2,000	2,000
Parental contribution plus total formula aid	$3,000	$3,000	$3,000	$3,000

John and Joan have the same expected family (parent plus student) contribution of $2,300 according to the PGI methodology. But, Joan's LEEA is $450 greater than John's LEEA. Joan's student contribution is large enough to preclude a Pell grant even though her expected parental contribution is much smaller than John's. However, because her parental contribution is lower than John's, she is eligible for a State award. Her LEEA exceeds John's LEEA by enough that, added to her State grant, it makes up the difference between their expected student contributions. The Pell program "taxed" her income by reducing her Pell award by the amount of her expected student contribution, bringing it to $0. By not taking account of this contribution, the State program effectively replaced $850 of those funds. The LEEA program replaced the rest.

Now consider Sue, Steve, and Joan. They have the same expected parental contributions, but different expected student contributions. Their Pell awards vary by the difference in their student contributions. They all receive the same State grant. Their LEEA grants each equal the difference between $3,000 and their Pell and State grants and expected parental contributions. Because they all have the same parental contributions, they all have the same State grant. Hence, their LEEA grants differ by the differences in their Pell awards. The LEEAs replace funds the student would have received were it not for the expected student contribution portion of the Pell formula.

PROPORTION OF LEEA DOLLARS USED TO REPLACE THE STUDENT CONTRIBUTION

It is evident from the discussion above that LEEAs equalize differences among students in the amount of formula gift-aid they receive when these differences stem from disparities in their expected student contributions. We used the formula below to compute the proportion of LEEA dollars that were used for this purpose (where family contribution is the PGI measure of expected parent plus student contribution):

$$\text{Offset} = \text{LEEA} - \text{target cost} + \text{Pell} + \text{State} + \text{family contribution}$$

The sum of the offsets divided by the sum of the LEEAs at a school indicates the proportion of LEEA dollars at that school that went to reimburse students for the Pell tax. Overall, about 61 percent of all the funds expended through the LEEA program in 1989–90 were used to replace dollars the "expected student contribution" portion of the

Pell formula took away. These funds essentially counteracted the federal policy of reducing aid by the amount of the student's expected contribution.

The size of the offset varied considerably among schools. The overall percentages at public and private schools were 71 and 42 percent, respectively, but some private schools had larger offsets than some public ones. The overall disparity between public and private schools occurred because the difference between family contribution (as measured by the PGI) and parental contribution (as measured by Congressional Methodology) tends to be greater for students at public institutions than for those at private institutions. We suspect that this occurred because public school students are more likely to work (during high school and college) than those at private institutions.

OTHER INTERACTIONS AMONG FORMULA-AID PROGRAMS

We examined one additional question to further understand how formula-aid programs are affected by each other and by external factors, namely, what accounted for the large increase in both the number and the amount of LEEAs offered for the 1991–92 academic year relative to previous years?

In 1990–91, the program provided more than 16,500 grants totaling about $8.3 million. In 1991–92, it offered nearly 24,000 awards totaling almost $14 million. If the 75 percent acceptance rate of LEEA awards that has been typical of prior years held for the 1991–92 period, then the program would have granted about 18,000 awards totaling about $10.5 million. This is about a 25 percent increase in funds (and a 10 percent increase in the number of awards) over the prior year. Listed below are the factors we hypothesized as possibly contributing to this increase:

- More students applied for LEEAs.
- Educational costs increased.
- The state's rationing factor decreased from 77 to 63 percent.
- The recession reduced expected parental contributions.
- There was a redistribution of students among schools—this would increase LEEA amounts if proportionately more students went to the relatively more expensive schools.

We conducted an analysis to determine how much each of these factors contributed to the large increase in the amount the LEEA program awarded between the 1990–91 and 1991–92 school years. This was done in a multistep process. The first step estimated how much the LEEA program would have awarded in 1991–92 if the number of applicants that year had been the same as it was in 1990–91 (and nothing else about the 1991–92 period was changed). This analysis projected that the program would have offered about $10 million in grants in 1991–92 instead of the $14 million it actually offered. Thus, the program would have offered $4 million less in 1991–92 if the number of applicants that year had been the same as it was in 1990–91.

Similarly, we estimated how much the LEEA program would have awarded in 1991–92 if the state's rationing factor for that year was put back to its 1990–91 level of 77 percent (and nothing else about 1991–92 was changed). This analysis estimated that if this and only this change were made, then the LEEA program would have offered about $11.2 million in awards rather than the $14 million it actually offered, i.e., a difference of about $2.8 million.

This process was repeated for each of the other three factors noted above. The five differences computed in this way ($4 million, $2.8 million, etc.) totaled $9 million. The relative contribution of each factor was estimated by dividing its difference value by $9 million. For example, about 44 percent of all the disparity between 1990–91 and 1991–92 in the amount the LEEA program offered could be attributed to the increase in the number of applications between these two years (because 4/9 = 44 percent). Appendix C describes the specific procedures that were used to make the estimates and the assumptions underlying these procedures.

Table 4.2 shows that the reduction in the state's rationing factor accounted for about 31 percent of the increase. Lower expected parental contributions and increased educational costs were responsible for the balance of the increase. The 1991–92 recipients were somewhat more likely to go to the relatively less expensive schools than were their 1990–91 counterparts. Were it not for this redistribution of students across schools, the increase in the LEEAs would have been somewhat greater.

Table 4.2

Relative Contributions of the Factors That Affected the Increase in LEEAs Between the 1990–91 and 1991–92 School Years

Factor	Contribution, %
Increase in the number of eligible applicants	45
Reduction in state rationing factor from 77% to 63%	31
Decrease in average expected parental contribution	15
Increase in cost of education (tuition, fees, etc.)	14
Redistribution of recipients to less-expensive schools	–5
Total	100

IMPLICATIONS

The analyses discussed above show that the amount a student receives under the LEEA program is significantly affected by the policies governing other formula-based aid. Specifically, the size of a student's LEEA is influenced by the PGI's use of expected student contribution and the state's rationing factor. LEEAs also are affected by external factors, such as increases in the number of students going to college, increasing costs of attendance, and decreased family assets. Moreover, more than half of the LEEA dollars are used to replace the funds students would have received from the Pell program were it not for Pell's use of expected student contribution.

The next section of this report discusses how the effects of the LEEA program are further influenced by the presence of institutional and other gift-aid.

5. COMBINING FORMULA AND DISCRETIONARY GIFT-AID

The previous section discussed how Pell and State formulas as well as external factors affect the size of a student's LEEA. This section discusses the problems associated with measuring who benefits from the LEEA program. While it is clear that this program adds to the total amount of gift-aid awarded to Indiana residents, it is not obvious who benefits from it (let alone by how much).

This uncertainty arises because many of the beneficiaries of the LEEA program are not LEEA recipients. This occurs as a result of the policies colleges use to create the total gift-aid package, i.e., the policies that govern how much they contribute from their discretionary funds to LEEA and non-LEEA recipients. Consequently, this section discusses how LEEAs fit into the total gift-aid package, how schools construct this package, and finally, the implications of these practices for measuring the effects of the LEEA program. One of these implications is that it is not possible to assess the effects of a formula gift-aid program by focusing solely on who receives that aid.

TOTAL GIFT-AID IN INDIANA

Almost half of all the gift-aid awarded to Indiana students in 1989–90 came from the formula-based aid discussed in the previous sections (i.e., Pell, State, and LEEA grants). Another 46 percent consisted of awards that were under the discretionary control of the student's school (e.g., funds from endowments as well as federal and state block grants). The remaining 5 percent came from other federal and state sources, such as the Veteran Benefits Program, grants from the Bureau of Indian Affairs, Social Security benefits, Paul Douglas Teacher Scholarships, Hoosier Scholarships, nursing scholarships, and minority teacher scholarships (Table 3.1).

The formula-based portion of the total gift-aid package is much greater at the public than at the private colleges, but the reverse is true for institutional support. However, regardless of school type, the amount awarded through the LEEA program is only a small part of the total gift-aid package. The implications of this small share for measuring who benefits from the LEEA program are discussed below.

EQUITY PACKAGING POLICIES

In 1974, the College Entrance Examination Board formed a task force on the management of student assistance programs. This task force, under the leadership of Francis Keppel (former Commissioner of the U.S. Department of Education), recommended that colleges adopt a financial-aid packaging policy that would "maximize equity and insure that priority for grants not be on the basis of academic achievement or special talent" (NASFAA, 1983, p. 52). This policy, which has become known as "equity packaging," has been adopted by hundreds of colleges and universities across the country.

This policy is implemented in two generic ways. The "absolute" method is exemplified by the policy at Ball State. This school computes the sum of the following factors: expected parental contribution, all formula aid (Pell, State, and LEEA), all outside awards (such as grants to encourage minority students to go into teaching), and any merit-based awards. Ball State uses its limited discretionary aid to make up any difference between this sum and $4,300 (Ball State would raise the $4,300 limit if it had more discretionary aid to give).

The "fixed percentage" version of equity packaging is illustrated by the policy at DePauw University. This private school defines "need" as the difference between the total costs of attendance (roughly $18,000) and the sum of the expected parental *and* student contributions from assets and work study. It also classifies students into six levels on the basis of their predicted first-year grade point averages (GPAs). This is done using high school grades and admissions test scores. Finally, it uses its discretionary aid to ensure that all students with the same combination of need and predicted GPA receive the *same* total gift-aid from all sources. Loans (such as Perkins and Stafford) are expected to make up any shortfall between the total cost of attendance and the sum of all gift-aid and expected parental and student contributions.

Table 5.1 illustrates the DePauw procedure for two hypothetical students, one from Indiana and the other from Ohio. Both students have the same predicted GPA and need level (of $15,000). In this scenario, neither receives a Pell award because the sum of each student's expected parental and student contributions exceeds the Pell limit. The Indiana student receives the maximum State award of $3,800 and a LEEA of $1,150, i.e., a total of $4,950 in formula gift-aid. DePauw's target for these students is 67 percent of their need level, which equals $10,075 (67 percent of $15,000 = $10,075). It therefore gives $5,125 to the Indiana student ($10,075 – $4,950 = $5,125), and nearly twice that much to the Ohio student.

Table 5.1

Illustration of the Fixed Percentage Version of Equity Packaging

	Indiana Student	Ohio Student
Total cost	$18,000	$18,000
Family contribution	–3,000	–3,000
Total need	$15,000	$15,000
Pell	0	0
State	3,800	0
LEEA	1,150	0
Institutional aid	5,125	10,075
Target (67% of need)	$10,075	$10,075

NOTE: Assume that tuition and maintenance costs were $12,000 and $6,000, respectively. Both students had expected parental and student contributions of $2,000 and $1,000 (according to both Congressional and PGI methods). The Indiana student received the maximum State award of $3,800 because tuition and fees exceeded the $6,000 cap. Because this is a private school, the LEEA grant is 50 percent of: 0.45($18,000) – ($3,800 + $2,000) = $8,100 – $5,800 = $2,300.

Now suppose that both the State and the LEEA programs were discontinued. If that happened, both students still have the same need. But, the total number of dollars DePauw has to allocate to discretionary aid for all students has not changed. Thus, it must lower its rationing factors for percentage of need met to prevent exceeding its budget. The Indiana and Ohio students will therefore now receive equal gift-aid from the school, but the total amount of gift-aid they get from all sources will be less. This example illustrates why the amount of gift-aid a school offers to out-of-state students is affected by the State and LEEA aid its in-state students receive.

This example also illustrates that all other things being equal, Indiana colleges that are concerned about the bottom line will be more willing to accept in-state students with financial need than out-of-state students with that same need because in-state students bring State and LEEA dollars with them. Put another way, because of the State and LEEA dollars Indiana residents bring with them, Indiana colleges do not have to contribute as much of their own funds to support an in-state student as an out-of-state student. This is true even at the public schools because, despite differences in tuition between these two kinds of students, an Indiana student with a given expected parental contribution is likely to bring more dollars to the school's general fund than a comparable out-of-state student.

EXTENT OF EQUITY PACKAGING IN INDIANA

Our interviews with financial-aid officers throughout Indiana led us to conclude that most schools use some form of equity packaging, although how they operationalize this policy varies as a function of individual school policies (e.g., some consider academic ability as well as financial need in creating the total gift-aid package). To obtain a quantitative estimate of how often equity packaging is used in Indiana, we examined how many 1989–90 LEEA recipients also received discretionary aid (i.e., institutional and/or SEOG funds). If many LEEA recipients at a school received such aid, then it suggests that the school is trying to bring its gift-aid recipients up to some equity level.

Across all Indiana schools, 51 percent of the 1989–90 LEEA recipients received discretionary aid (institutional and/or SEOG funds) in addition to their LEEA dollars (see the last row of Table 5.2). Taken together, these students received 45 percent of the $8.2 million LEEA dollars that were awarded in that year. The upper portion of Table 5.2 shows the percentage of LEEA recipients who also received discretionary aid at the 12 schools with the largest numbers of LEEA recipients.

Table 5.2

Schools with the Highest Numbers of LEEA Recipients and the Percentage at Each School Who Also Received Discretionary Funds

School	Number of LEEA Recipients	Percentage Receiving Discretionary Aid[a]
Butler	970	98
DePauw	462	93
University of Evansville	955	85
University of Indianapolis	491	82
Purdue University, West Lafayette	1,707	57
Rose-Hulman	458	41
Indiana State	767	35
Ball State	2,086	30
IUPU Fort Wayne	451	26
IUPU Indianapolis	691	25
IU Bloomington	1,356	22
Vincennes	588	9
All schools in Indiana	15,487	51

[a]Discretionary aid = institutional aid + SEOG funds.

As anticipated from our interviews with financial-aid officers, equity packaging was most evident at the private schools, such as Butler and DePauw. Only 30 percent of the LEEA recipients at Ball State received discretionary aid. Hence, the other 70 percent must have gone over this school's self-imposed equity limit of $4,300, i.e., the combination of their parental contribution, formula aid, and other grants exceeded the $4,300 limit.

If discretionary aid also includes other funds (such as those disbursed by departments within a school), then the minimum percentage of LEEA recipients affected by equity packaging increases from 51 to 60 percent. Moreover, because of the LEEA program, many non-LEEA recipients receive discretionary aid (or more discretionary aid than they would otherwise receive). This occurs because the school does not have to expend as much of its limited resources on LEEA recipients to bring them up to the school's equity level. In short, the percentages in Table 5.2 underestimate the true percentage of all of the gift-aid recipients that are affected by equity packaging.

IMPLICATIONS OF EQUITY PACKAGING

One inference that can be drawn from the discussion above is that the State and LEEA gift-aid that is given to Indiana students increases a college's ability to attract qualified out-of-state students who have financial need. It also increases the school's ability to attract in-state students who are not eligible for Pell, State, or LEEA grants. Without the State and LEEA aid, a college would have to devote more of its discretionary dollars to the students who now receive State and LEEA grants. Hence, under equity packaging, all students with financial need who attend an Indiana college benefit from all of the gift-aid dollars going to their school, regardless of its source.

A second implication of equity packaging is that the size of a school's discretionary aid budget influences the size of a student's total gift-aid package. The larger the per capita budget, the greater the impact the school has on a student's total gift-aid package.

The regional campuses of Indiana's two largest public schools award relatively few institutional dollars per recipient (and a portion of what they grant may go to students who are not even eligible for Pell, State, or LEEA aid). Thus, a student's total gift-aid package at a regional campus is driven mainly by what that student receives in the form of Pell, State, and LEEA dollars. The targeting policies that are inherent in these formulas therefore have a larger effect at these

schools than they do at the schools that disburse large amounts of discretionary aid.

Some schools fall in between the well-endowed (public and private) colleges on the one hand and the regional campuses on the other in terms of how much institutional support they provide. The schools in this intermediate category use equity packaging to partially even out total gift packages. However, because they do not have the funds to do it fully, some differential may remain. Indiana State is a good example of a school in this category.

Schools vary greatly in the extent to which they consider expected student contributions, private scholarships, and other "outside" grants in the packaging process (Harris, 1986). One student may therefore receive more total gift-aid than another even though they have comparable expected parental contributions and educational costs. Hence, a third implication of our findings is that the variations in policies among schools combined with the overall strategy of equity packaging make it virtually impossible to assess the effects of a particular gift-aid program (such as LEEA) by focusing exclusively on the students who receive awards from that program.

WHO BENEFITS FROM LEEAs?

Although the question of who benefits from LEEAs cannot be answered by studying the students who receive them, it can be answered by studying the schools they go to. When students bring their LEEAs (and State grants) to a school, they increase the total amount of funds all gift-aid recipients at that school receive. Quite simply, all financial-aid recipients benefit as more funds are added to the pot.

With this in mind, we return to the discussion in Section 3 that noted that proportionately more LEEA dollars (and grants) went to private schools than would be expected solely on the basis of the distribution of in-state students to private and public colleges. Specifically, although only about 15 percent of the in-state, full-time students at four-year schools attended a private college in 1989–90, about 31 percent of the LEEA dollars awarded that year went to students at these schools. Thus, by this measure, private schools particularly benefit from the LEEA program. However, in absolute terms, the bulk of the LEEA dollars went to public schools.

Another way to address the question of who benefits from LEEAs is to examine what would happen if the program was discontinued, and a school divided all the gift-aid that remained equally among all of its gift-aid recipients. For example, if the LEEA portion of the total gift-

aid at a school was $50,000 and there were 250 gift-aid recipients at that school (including those who did not receive LEEAs), then the net effect of eliminating the LEEA program at this school would be to reduce the average gift-aid a recipient would receive by $200. We recognize that a perfectly even distribution of remaining dollars could not happen in practice because of restrictions on those dollars, but our hypothetical example nevertheless provides insight into which schools are most affected by the LEEA program.

Analysis of this issue suggested that the effects of eliminating the LEEA program would vary considerably across schools (Table 5.3). The Indiana Vocational Technical colleges would generally experience an annual reduction of less than $50. There would be an average reduction of $160 per gift-aid recipient at the main campus of Indiana University, the largest public university in the state, but $225 at Purdue University's main campus, the second largest. The reduction at the next two largest public schools fell in between these amounts.

Eliminating the LEEA program is likely to have less of an effect at private than at public colleges. Most private schools were in the $100 to $150 range, whereas all but three of the four-year public schools were above this range. Relatively well-endowed private schools (such as Earlham, Notre Dame, and Butler) would be less affected by a cancellation of the LEEA program than would Rose-Hulman Institute of Technology, which relies heavily on LEEA money and would therefore lose about $350 per gift-aid recipient if the program was discontinued (see Appendix D). Purdue Calumet would experience the largest loss ($500).

Table 5.3

Projected Reduction in a Student's Average Gift-Aid If the LEEA Program Was Eliminated and All Other Gift-Aid at the Student's School Was Allocated Equally to All Gift-Aid Recipients

Average Reduction	Public Schools	Private Schools
<$50	All Indiana Vocational Technical Colleges[a]	St. Meinrad Indiana Institute of Technology Goshen College Hanover College Anderson University
$51-$100		Calumet College of St. Joseph Tri-State University Bethel College Manchester College
$101-$150	IU Kokomo IUPU Indianapolis University of Southern Indiana	Oakland City College St. Joseph's College University of Indianapolis University of Evansville Earlham College University of Notre Dame Butler University
$151-$200	IU East IU Bloomington IU South Bend Indiana State IU Southeast IU Northwest	Wabash College
$201-$250	Ball State University Purdue West Lafayette	DePauw University Huntington College
$251-$300		
>$300	Purdue North Central Vincennes University[a] IUPU Fort Wayne Purdue Calumet	Rose-Hulman Institute of Technology

[a]Two-year colleges. Data were missing for a few small private schools.

6. EFFECT OF LEEAs ON COLLEGE PARTICIPATION

The primary purpose of the LEEA program is to increase Indiana residents' college participation rates.

> In the words of Thomas H. Lake, Chairman of the Board of the Lilly Endowment, Inc. the Endowment's gift [of $50 million] recognizes the importance of higher education to individual fulfillment and to the vitality of the state as a whole. It also responds to recent data showing that Indiana residents are not keeping pace with the nation in pursuing an education beyond high school (*Procedures Manual*, I-1.1, 9/6/88 rev).

For the reasons discussed in Section 5, it is not feasible to determine whether the goal of increasing participation is achieved by focusing on the students who receive LEEAs. At most Indiana institutions, equity funding effectively transforms a LEEA grant into an increase in the aggregate gift aid available at the grant recipient's institution. In short, the effects of LEEAs on Indiana residents' college participation may extend well beyond the effects of the program on LEEA grant recipients. Hence, program effects have to be examined in the context of overall participation rates.

INDIANA'S INDEX OF COLLEGE PARTICIPATION RATES

In 1986, one year before the inception of the LEEA program, the staff of the Indiana Commission for Higher Education recommended that college participation be assessed with the following index:

$$\text{Index} = \frac{\text{Fall undergraduate college enrollments}}{\text{Resident state population aged } 18-24}$$

The staff chose this index because its "calculation is simple, easy to duplicate, recognizes the changing size of the education target group, depends on easily obtainable data, and has approximately the same meaning from state to state . . ." (State of Indiana, 1986, p. 4). Although the commission recognized that this index did not properly capture interstate migration, it argued that other methods were equally deficient.

According to the commission's index, the college participation rate in Indiana has consistently fallen well behind the national rate and that

of its neighboring states. It further indicates that relative to other states, Indiana's participation rate did not increase when the LEEA program was implemented. However, there are several concerns about the validity of this index. To begin with, its numerator contains three distinct populations: Indiana resident undergraduates aged 18 to 24, Indiana resident undergraduates 25 years old or older, and nonresident undergraduates. The numerator does not include Indiana residents aged 18 to 24 attending out-of-state postsecondary institutions.

Our analysis found significant differences in enrollment patterns among these groups relative to trends over time in other states. Thus, by mixing some groups together and ignoring others, the index masks important differences among their participation rates (see Appendix E for a more complete discussion of the commission's index).

AN ALTERNATE MEASURE OF COLLEGE PARTICIPATION IN INDIANA

The *Current Population Survey* provides data on respondents' college participation. Since 1984, the survey sample has been large enough to support analysis of participation at the state level. The data do not identify whether a student is attending an in-state institution. However, they can be used to examine a more basic question, namely, what fraction of a state's 18–24 year olds participate in higher education, regardless of where?

College participation systematically varies over the course of a year. Participation is greatest in the fall, declines over the academic year as students complete programs of study or drop out of school, and then falls to comparatively low levels over the summer months. Although comparisons of participation rates over time or among states can be based on any consistent set of months, policymakers have traditionally focused on fall enrollments. Accordingly, we used the *Current Population Survey* data for October and November to compute participation rates for 18–24 year olds by state of residence through 1988, the most recent year for which data were available.

Table 6.1 presents these rates for Indiana residents and residents of other states. This table shows that the Indiana participation rate for 18–24 year olds was stable during the 1984–86 period. It then rose sharply in 1987 and continued at the higher rate in 1988 (the last two

Table 6.1

College Participation Rates of 18–24 Year Olds in Indiana and in Other States

Year	Percent Participating: Indiana Residents	National Average	Bordering States' Residents[a]	Indiana's Rank
1984	23	28	30	43
1985	21	28	27	47
1986	23	28	30	42
1987	28	29	31	30
1988	28	30	32	36

SOURCE: U.S. Department of Commerce, Bureau of the Census, *Current Population Survey*, October and November, various years.

[a]Bordering states: Illinois, Kentucky, Michigan, and Ohio.

years for which these data were available). By 1988, Indiana had largely closed the gap between it and the nation in participation rates for 18–24 year olds.

Table 6.1 shows participation in all higher education institutions, both in-state and out-of-state. However, the share of Indiana first-time undergraduates who attended an in-state institution grew relative to other states between the 1984–86 period and 1988 (see Appendix E). Thus, it appears that the growth in participation by Indiana residents 18–24 years old is largely attributable to residents going to in-state institutions. As these are the institutions for which LEEAs are available, the patterns displayed in Table 6.1 are consistent with the hypothesis that LEEAs increased participation by Indiana residents.

Table 6.2 uses different data sources to address this same issue. The upper panel refers to the fraction of high school graduates who enrolled in an in-state college or university within one year of graduating from high school. The lower panel refers to the fraction of high school graduates who enrolled in any institution of higher education during the year following their graduation.

Both panels of Table 6.2 exhibit the same general patterns: In 1984 and 1986, Indiana lagged well behind both the nation as a whole and its neighboring states in the rate at which its high school graduates went to college, either in-state or anywhere. Compared to Indiana students, recent high school graduates had higher in-state participation in two-thirds of the states and higher overall participation in four-fifths of the states.

Table 6.2

College-Going Rates of Recent High School Graduates

Group	Year	Percent Participating: Indiana Residents	National Average	Bordering States' Residents[a]	Indiana's Rank
Students	1984	34	38	37	34
going	1986	33	37	34	32
in-state	1988	40	40	40	19
Students	1984	38	46	45	42
going	1986	37	44	40	40
anywhere	1988	45	48	48	30

SOURCES: Number of students enrolling in college within one year of high school graduation from U.S. Department of Education (various years). Number of high school graduates from Research Associates of Washington (1991).

[a]Bordering states: Illinois, Kentucky, Michigan, and Ohio.

The pattern shifted dramatically in 1988. Participation by recent high school graduates, both in-state and overall, improved everywhere. But, in both categories, Indiana experienced considerably greater gains than did most other states. Although Indiana still lagged both its neighbors and the nation in terms of the rate at which its recent high school graduates went on to college, it had closed much of the gap in overall participation and moved up into the middle third of the states. Moreover, in terms of the rate at which recent high school graduates went on to in-state institutions, Indiana had caught up with the nation and its neighbors and moved into the top 20 states.

The sharp break from past trends in Indiana, and from the ongoing experience of other states, occurred in 1987 and 1988. The LEEA program began in 1987. The populations who broke from the past pattern, young men and women in the years immediately following high school, are precisely the populations the LEEA program targeted. In addition, the observed jump in participation is entirely due to increases in the rate at which recent high school graduates went to the institutions—in-state colleges and universities—for which LEEA grants were available.

These results are certainly consistent with the hypothesis that the LEEA program has had an effect on college participation in Indiana. However, we recognize that the observed trends may stem from other factors. In fact, until additional data become available, we cannot be

sure that the recent patterns are not simply aberrations. For now, we can only conclude that participation patterns in Indiana during the late 1980s are consistent with what we would expect if the LEEA program was having a positive effect.

PROJECTIONS BASED ON PAST RESEARCH

There have been numerous attempts to estimate the effects of student financial aid on participation. However, the available data are limited and the methodological problems encountered in these studies are severe. Not surprisingly, their results are mixed (see Appendix F for details).

Leslie and Brinkman (1987, 1988) provide a concise review of the student demand literature. They distill from each of a wide variety of econometric cross-sectional studies the percentage point change in the enrollment rate for all 18–24 year olds, per $100 (1982 dollars) increase in the 1982–83 average cost of tuition, room, and board. The parameters from these 25 studies are then combined to give a consensus estimate. Leslie and Brinkman estimate that a $100 increase in net cost will cause a decline of 0.7 percentage points in the national aggregated enrollment rate for first-time students. If we assume that the provision of aid would have an equal and opposite effect, $500 in aid (in 1991 dollars) would increase the enrollments by about 2 percentage points.

Studies that employ econometric modeling approaches to analyze data on individual students tend to find that the availability of financial aid has a positive effect on the likelihood that students will go on to college. Estimates of the magnitude of this effect vary greatly. Overall, they suggest that the provision of $500 (in 1991 dollars) in gift-aid to a specified population would result in an increase of 1 to 3.5 percentage points in the participation rate of the members of that population (see Appendix F).

If a student's total gift-aid increased by the full size of that student's LEEA, then these rates suggest that roughly 350 to 1,300 of the approximately 18,000 LEEA recipients who went to college in the fall of 1991 would not have gone were it not for their LEEA grant (see Appendix F). However, because of equity packaging, it is unlikely that a student's total gift-aid rose by an amount equal to the size of that student's LEEA. At many if not most schools, equity packaging essentially spreads the LEEA dollars across *all* gift-aid recipients, which in turn dilutes the impact of the LEEA program on participation rates. Consequently, an increase of 350 to 1,300 participants is

most likely an upper-bound estimate of the effects of the LEEA program on 1991–92 participation rates.

Finally, numerous studies have examined the relationship (over time or across states) between the amount of gift-aid students receive and aggregate enrollment rates. In general, these studies have not found a correlation between the availability of aid and participation (see Appendix F).

7. SUMMARY AND CONCLUSIONS

Since its inception in the fall of 1987, the LEEA program has awarded about $50 million in gift-aid to Indiana residents going to college as full-time, undergraduate students in that state. About two out of three LEEA dollars go to students at public colleges. This program accounts for about 3 percent of all the gift-aid awarded to undergraduates at Indiana schools. The remainder comes from other formula-based aid (federal Pell and State grants), discretionary aid from the student's college (such as from its general scholarship fund), and other sources. The gap between the total cost of attendance (tuition, fees, room and board, etc.) and the amount of gift-aid awarded is presumably filled by the student's assets and income, parents' assets and income, and loans.

SUMMARY OF FINDINGS

Most LEEA recipients come from families whose income is near the median for Indiana. In contrast, those receiving federal Pell or State grants are much more likely to come from homes with income levels that are well below the median. Thus, LEEAs are often given to a different segment of the population of students with financial need than is reached by the Pell or State programs. However, income is not the main determinant of the size of a student's LEEA. Instead, LEEA size is a function of the cost of attendance at the student's school, any Pell or State awards the student received, and the expected contribution of the student's parents (as determined by the Congressional Methodology, which is based on income, assets, and allowable deductions).

Formula-aid programs do not operate in a vacuum. They interact with each other and with external factors. For example, all other things being equal, the Pell formula gives students less money if they have their own income and assets (i.e., independent of their parents' expected contributions). The student who works and saves through high school therefore receives a smaller Pell award than the student who did not save for a college education. Because of the relationships among formula-based aid programs, over 60 percent of the LEEA dollars have the effect of offsetting the Pell formula's use of expected student contribution. In short, they replace funds the student would have received were it not for the student having income and assets while in high school and college.

Formula-aid programs also interact with other sources of support to form the total gift-aid package. In the 1989–90 school year, formula-based aid (Pell, State, and LEEA) accounted for 63 percent of the $129 million in total gift-aid awarded at public schools and 28 percent of the over $87 million awarded at private colleges. The rest was made up by the school's discretionary funds and other sources. Most financial-aid officers report that they try to disburse these discretionary funds in a way that equalizes the actual cost of education to all students. This is called "equity packaging."

To bring all students with financial need up to the same equity level, a school will often allocate more of its discretionary dollars to non-LEEA recipients than to LEEA recipients. Put another way, all financial-aid recipients at a school benefit from the LEEA dollars flowing to that school, not just the students who officially receive LEEAs. The LEEA dollars students bring with them may therefore be viewed as a grant to their school's general scholarship fund. Since only Indiana residents can bring LEEA and State dollars to Indiana schools, these students should be particularly attractive to these schools.

Because of equity packaging, the targeting policies that are inherent in the Pell, State, and LEEA formulas only really come into play at the schools that have little or no discretionary dollars to give. As a school's per capita discretionary budget increases, it gains more control over the total (formula plus discretionary) gift-aid package. Equity packaging at schools that allocate even moderate amounts of discretionary aid can therefore dilute or even eliminate the effects of the targeting policies that are embedded in the Pell, State, and LEEA formulas.

Equity packaging also may dilute the intent of grants that are not based on financial need. For example, one school considers the gift-aid a student receives from *all sources* before deciding how much of its own funds to award. Thus, a student who receives a State grant for academic scholarship (or for being a minority group member who plans to go into teaching) would receive less discretionary aid from this school than would a similarly situated student who did not receive such an award. And, even though LEEA dollars often replace funds the Pell formula removed, some schools effectively reinstitute the Pell policy by considering expected student contribution when they construct the total gift-aid package.

The prevalence of equity packaging in Indiana is indicated by over 50 percent of the LEEA recipients also receiving some form of discretionary aid. This is a very conservative measure of prevalence. If a

LEEA award puts a student over a school's equity limit (and thereby precludes that student from receiving discretionary aid from the school), then some non-LEEA recipient will no doubt get a larger slice of the school's discretionary budget. By LEEA giving dollars to some students, schools can give more of their discretionary dollars to other students.

One implication of this situation is that it is virtually impossible to target LEEAs (or any other formula-based aid) on certain groups unless there is some control over equity packaging. Any differential effect of a program in terms of who receives formula aid (or how much they receive) is diluted or eliminated by equity packaging.

Another implication of current packaging policies is that they make it impossible to measure the effects of a given formula-based program (such as LEEA) by focusing on the students who receive awards from that program. For example, it would be meaningless to ask students what they would do if they lost their LEEA grant because at most schools, equity packaging would substantially dilute the effect of such a loss across all gift-aid recipients.

CONCLUSIONS

Given these findings, what can we conclude about the effects of the LEEA program? One obvious conclusion is that it added to the total gift-aid awarded in Indiana. The state did not reduce the total amount it granted when the LEEA program was introduced (nor did it change how it awarded this aid). Second, most of the LEEA grants (and dollars) went to students at public schools and thereby allowed these schools to give more of their discretionary dollars to other students with financial need. Nevertheless, the private schools' share of the LEEA dollars (31 percent) is quite large relative to their 15 percent share of all the in-state students attending Indiana colleges.

Although it was not feasible to assess what individual colleges did as a result of the LEEA program, it is unlikely that it led them to reduce the amount of discretionary aid they granted. Thus, it appears that the program enabled a net increase in the amount of gift-aid awarded. There are three ways such an increase could be felt:

- Increase the percentage of students going to college.
- Provide students with more choice in where they went, e.g., they could select a more-expensive school over a less-expensive one.
- Reduce a student's loan burden.

Participation

We examined the effects of the LEEAs on participation rates by looking at demographic trends and making projections from past econometric studies. The first approach showed there was a small increase in college participation rates in Indiana corresponding to the inception of the LEEA program. Among those who would most likely benefit from this program (18–24 year old Indiana residents), the participation rate rose slightly compared to rates in neighboring states (see Tables 6.1 and 6.2). However, there are many other factors besides the LEEA program that may have produced this increase. Hence, we cannot be confident that any of this increase in participation rates is attributable to the LEEA program.

If we apply the estimates derived from past econometric research to Indiana data, then we would project that the LEEA dollars increased participation in the 1991–92 school year by about 350 to 1,300 students. Put another way, the elasticity coefficients from other studies (along with many assumptions about Indiana) suggest that the LEEA program led to a small increase in the total number of students going to college. However, some (or many) of those who did attend because of the LEEA dollars may not even have been LEEA recipients.

Although there are serious concerns about relying on either the demographic or econometric approaches to measuring the effects of the LEEA program on participation, both strategies suggest that this effect is probably fairly small. In other words, it seems likely that relatively few students went to college as a direct result of the LEEA program (and an even smaller number because they themselves received LEEA dollars). One would not expect a much larger effect, because LEEAs account for only about 3 percent of the total gift-aid package.

School Choice

The analysis of program effects on school choice was done indirectly by examining how much gift-aid a LEEA recipient would lose if the LEEA program was eliminated and all the remaining gift-aid was redistributed to all gift-aid recipients at a school under a pure equity packaging policy. This analysis showed that on average, a LEEA recipient would lose less than $150 from the total gift-aid package. However, we recognize this is an average and it assumes that all of the remaining gift-aid is distributed equitably among all gift-aid recipients according to need. It is unlikely that this goal would be met at all schools and thus, some students would be more affected than

others by the loss of the LEEA program. Nevertheless, the overall statewide effect on school choice probably would be fairly small if schools continue to employ equity packaging.

Almost all the students we interviewed said that if their gift-aid package was reduced by even the full size of their LEEA, they would meet this shortfall by taking out a larger loan rather than switching to a less-expensive school. None said they would drop out of college. These observations along with the results of the empirical simulations described above suggest that the LEEA program probably did not have much impact on which schools students attended. However, there were five colleges (Purdue University, Calumet and North Central; Rose-Hulman Institute of Technology, IUPU at Fort Wayne, and Vincennes University) where eliminating the LEEA program would reduce a gift-aid recipient's package by over $300. These schools could very well lose students to other colleges if the LEEA program was discontinued.

Loan Burden

The foregoing considerations led us to conclude that the probable main effect of the LEEA program was to reduce a student's loan burden (rather than increase participation rates or provide more choice in which school to attend). Such a reduction may be very important to many students because by not having to work for these dollars (and often at or close to the minimum wage), they can devote more time to studying and being involved in campus activities.

Appendix A
DATA SOURCES

A majority of the analyses performed for the review of the LEEA program relied on two data sources: the State Student Assistance Commission of Indiana (SSACI) and the State of Indiana Commission for Higher Education Student Information System (SIS). The SSACI data were available for academic years 1984–85 through 1991–92. The SIS data were available for academic years 1984–85 through 1989–90.

The SSACI data contain information used to administer the LEEA program and the State grant program, comprising State Higher Education Awards and Freedom of Choice Awards. The data are limited to students who participate in at least one of these programs.

For every year, and for each student who participated in at least one of these programs, the data contain a record which includes a unique SSACI student identifier, the academic year, the student's name and social security number, whether the student is dependent on parental support or independent and self-supporting, the dollar amounts of the student's State and LEEA grants, the college the student attended, whether the college is public or private, the student's expected parental contribution according to the Congressional Methodology, estimates of the student's Pell Grant Index and Pell grant,[1] and the cost factors used by the State and LEEA programs for calculating awards.

The SSACI data indicate the actual amount of aid a student received from State and LEEA grants for the academic years 1984–85 through 1990–91. Thus, if a student completed only half the year and, consequently, received only half the grant offered, the record shows the amount received, not the amount offered. Because the 1991–92 academic year is still in progress, the data have not yet been reconciled. They indicate the amount granted to the student, regardless of how much of the money the student will eventually receive. In particular, the 1991–92 data include grants offered to students who decline the award because they did not go to college in Indiana or did not go full

[1]SSACI determines a student's State and LEEA awards in the spring, before the student's Pell grant has been determined. SSACI estimates the student's PGI and Pell grant and uses the estimated Pell grant in determining the student's LEEA grant.

time. In prior years, about 75 percent of State and LEEA awards have been used.

These data have important limitations. Only full-time students who are Indiana residents and demonstrate financial need are eligible to participate in these grant programs. Therefore, the data provide information only for this select group. Even then, the data do not indicate the student's progress through school, family income, age, or other demographic characteristics. Also, these data do not include information on loans or gift-aid other than Pell, State, and LEEA grants.

The SIS data include general information for every student enrolled in participating institutions and detailed information on their financial aid from all sources.

For each year and student, the SIS data record the student's race, sex, home zip code, age, college class, and family income. They also distinguish in-state from out-of-state residents, students living on campus from those living off campus, and transfer students and incoming freshmen from returning students.

For the 1988–89 and 1989–90 academic years, the financial-aid data contained the amount of aid each student received from each major formula gift-aid program (Pell, State, and LEEA); the Supplemental Educational Opportunity Grant SEOG program; institutional gift-aid; Veterans programs; other private, state, and federal gift-aid; Stafford, Perkins, and other loans; and work study. Each aid type was recorded separately and for both the regular academic year and summer sessions. Before 1988, the various sources of aid were grouped together and summer session data were not recorded separately.

The SIS data are provided by the individual institutions and compiled by the Indiana Commission for Higher Education. All public institutions are required to participate every year, but private institutions participate voluntarily. Fortunately, most private institutions reported every year and provided all the requested information. However, some institutions never participated, others participated irregularly, and some of those who participated did not provide all the requested information.

The SIS data had further limitations. Although the data contained information on all students, not just aid recipients, income data were available only for aid recipients. Furthermore, there were numerous discrepancies in coding and the values given for some variables were incorrect. In 1989 for example, at least one private institution recorded SEOG aid as both SEOG aid and as institutional aid.

Appendix B

THE EFFECTS OF USING THE PGI TO MEASURE A STUDENT'S ABILITY TO PAY FOR COLLEGE

The LEEA program is designed to equalize the proportion of college attendance costs left to a student after accounting for federal Pell and State grants and expected family contribution. The present LEEA formula uses the expected parental contribution (PC), as defined by the Congressional Methodology, as the measure of expected family contribution.

Parental contribution (as determined by the Congressional Methodology) is not the only available proxy of a family's ability to pay for college. A readily available alternative to PC is the Pell Grant Index (PGI). The PGI is the measure of a family's ability to pay for college used in determining the amount of a student's Pell grant.

Substituting PGI for PC in the LEEA formula could greatly change the LEEA program. Because of differences in the formula for calculating these two factors, PC and PGI are seldom equal. The major difference between these two factors is the inclusion in the PGI of an expected student contribution, based on the student's income and assets. This tends to make PGI greater than PC and tends to reduce the size of individual LEEAs.

This does not imply, however, that substituting PGI for PC in the LEEA formula will reduce the size of the entire LEEA program. For some students, PGI is less than PC; their LEEA grants would be larger if based on PGI rather than PC. For that matter, some students excluded from the current LEEA program (because the sum of their Pell and State grants and their PC exceeds their target cost of attendance) would be brought into the program if PGI were substituted for PC in the LEEA formula.

Because of the complexity of the consequences of changing the LEEA formula, the effects of substituting PGI for PC in the LEEA formula were studied with a simulation. In this simulation, the 1991–92 LEEA awards were recalculated using PGI rather than PC to determine each student's award. The procedures and results of this simulation are discussed below. Overall, the data indicate that using the PGI would reduce the amount awarded by the LEAA program by about $4.7 million per year. Almost all of this reduction (98 percent) would come from a decrease in awards to students at public schools.

The simulation assumes that changes in the LEEA formula would not alter a student's decision to apply for college. This is a reasonable assumption, because the details of the LEEA formula are not widely available to students. Under this assumption, a change in the LEEA formula affects only the amounts of aid students receive, not whether they go on to college, or which college they attend.

The SSACI data provide PC and PGI for every student who received either a State grant or an LEEA in 1991–92 (see Appendix A). For these students, we used the SSACI data to calculate what each student's LEEA would have been if PGI rather than PC had been used in the LEEA formula.

Information for students who did not receive either a State grant or a LEEA award in 1991–92 was not available. We had to estimate the number of such students and their PCs and PGIs. We assume that the bivariate distribution of PC and PGI for aid applicants has a known parametric form. The LEEA recipient data represent a truncated sample from this distribution and provide the data for estimating the parameters. From the estimated distribution, we compute the probability that a student who is currently ineligible for both State and LEEA grants becomes eligible when PGI is substituted for PC in the LEEA formula. The actual estimate of the number of rejected applicants derives from this estimated probability.

For the simulation, rejected applicants were grouped into four categories. The four categories were: (1) students with zero PGI who will be eligible for LEEA under the new formula; (2) students with positive PGI, and currently receiving only a Pell grant, who will receive both a LEEA and a Pell grant under the new LEEA formula; (3) students with a sufficiently large PGI to be currently ineligible for Pell, State, and LEEA aid, but who will receive a LEEA under the new formula; and (4) students who remain ineligible for State and LEEA grants even under the new formula. These categories are useful for estimating the sizes of awards.

The probability of a student being in one of these classes was estimated. The probabilities are denoted by P1, P2, P3, and P4, respectively. The estimates are denoted by p1, p2, p3, and p4. The number of students in each of the first three categories was also estimated. The estimates will be denoted by n1, n2, and n3, respectively.

Let P0 denote the probability that an aid applicant is eligible for either a State grant or a LEEA, N0 denote the number of aid recipients, and N denote the total number of LEEA applicants. Then $1 = P0 + P1 + P2 + P3 + P4$ and the expected value of N0 satisfies,

$$E(N0) = N * P0,$$

where E() denotes expectation. P0 is estimated by p0 = 1 – p1 – p2 – p3 – p4 and N is estimated by n = N0/p0. The estimate n1 is defined by n1 = p1 n, with n2 and n3 defined similarly. The probabilities are estimated by numerically integrating the estimated bivariate density.

The assumed bivariate distribution of PC and PGI is best described by considering the conditional distribution of PC given PGI and the marginal distribution of PGI. Given that PGI = 0, the probability that PC = 0 was assumed to be a positive unknown parameter and the probability that PC was in any positive interval was defined by a scaled exponential distribution with an unknown mean. The exponential distribution was scaled so that this conditional distribution was a proper probability distribution. The probability that PC = 0 and the unknown mean of the exponential distribution were estimated.

As noted above, because only PGI accounts for student wealth, PGI tends to be greater than PC. Thus when PGI = 0, there should be a positive probability that PC = 0. Because of other differences in the formulas for calculating PGI and PC, it is not necessary that PC = 0 when PGI = 0. It is even possible, although unlikely, that PC could be large. Thus, the model should concentrate most of the probability at or near zero with a long right-hand tail. Our model was chosen to fit these restrictions and the recipient data supported use of this model for PGI = 0.

Given any value of PGI greater than zero, the probability that PC = 0 was again assumed to be positive. This probability was assumed to be a linear function of the value of PGI on the logistic scale. That is,

$$Pr(PC = 0 \mid PGI, PGI > 0) = 1 / (1 + \exp(-u))$$

where exp denotes the exponential function and u = a + b PGI. The parameters a and b were estimated from the recipient data.

Given any value of PGI greater than zero, the probability that PC belonged to any positive interval was given by a scaled gamma distribution. The gamma distribution was scaled so that at each value of PGI the conditional distribution was a proper probability distribution. The mean of the gamma distribution was assumed to be a linear function of PGI. That is, if m(PGI) denotes the mean of the gamma distribution for a given value of PGI, then m(PGI) = c + d PGI. The shape parameter of the gamma distribution was assumed to be a constant that did not depend on PGI. The parameters of the linear func-

tion, c and d, and the shape parameter were estimated from the recipient data.

The justification for this model is analogous to the justification of the model used for PGI = 0. Given any value of PGI, PC will mostly likely be less than PC and could be zero. The most likely value of PC should grow larger as PGI grows larger, although this value may not exactly equal PGI. Finally, there is also a chance that PC could be large. The gamma distribution is skewed with a long right-hand tail and its center is just less than its mean. Therefore, a scaled gamma distribution with mean, m(PGI) and positive probability at zero satisfies all our models' requirements.

The assumed marginal distribution of PGI was also a scaled gamma distribution with an unknown mean and shape parameter and an unknown positive probability mass at zero. The mean, shape parameter and the probability that PGI = 0 were all estimated from the recipient data.

All parameter estimates were found using maximum likelihood techniques. The recipient data are samples from a truncated region of the sample space for all combinations of PC and PGI. Thus, the bivariate distribution of PC and PGI for the recipient data is a truncation of the distribution described above. The parameter estimates were obtained by maximizing the likelihood of the resulting truncated distribution.

The income distribution for financial-aid applicants at a given college or university will most likely depend on the cost of attending that institution. Thus, the parameters of the bivariate distribution of PC and PGI could vary systematically with educational costs. Such differences could bias our estimates. To avoid such biases, the institutions were stratified into five groups and five sets of parameters were estimated. The strata were: the Indiana Vocational-Technical Colleges, Purdue University of West Lafayette and Indiana University at Bloomington; the other four-year public universities, private universities, and colleges with 1990–91 tuition and fees less than $6,000; private universities and colleges with 1990–91 tuition and fees between $6,000 and $8,000; and private universities and colleges with 1990–91 tuition and fees greater than $8,000. Such stratification allowed for reasonable sample sizes, while safeguarding against bias.

For each institution, the estimates n1, n2, and n3 were calculated using both the corresponding estimated distribution and the total number of State or LEEA aid recipients at the school.

The size of a rejected applicant's award under the new formula was also estimated. Under the new LEEA formula, all students who belong to Category 1 of rejected applicants have a gap equal to the "target cost of attendance" (herein after referred to as "DC") less the maximum Pell award. In 1991–92, DC equaled 44 percent of tuition, fees, and maintenance costs. For the Indiana Vocational-Technical College, the 1991–92 maximum Pell award was $1,890, for all other institutions in Indiana the maximum was $2,400. At each institution, each of the n1 estimated new recipients was assigned this gap. The total cost to the LEEA program was calculated by multiplying n1 by the corresponding award (the gap for public universities, or half the gap for private institutions) and summing across institutions.

For students who belong to Category 2 of rejected students, the gap satisfies

$$GAP = DC - 2350 - PGI + [PGI],$$

where [PGI] denotes rounding PGI – 1 to the nearest multiple of 100.[1] Thus, for each institution, the average gap equals DC – 2400.50. At each college or university, each of the n2 estimated new recipients was assigned this average gap. The total cost to the LEEA program was calculated by multiplying n2 by the average gap (and half for private institutions) and summing across institutions.

Category 3 students each have gaps equal to DC – PGI. Each of the estimated n3 students in this category was assigned the average gap. The average gap equals (DC – 2000)/2.[2] Again, the total cost to the LEEA program was calculated by multiplying n3 by the average gap (and half for private institutions) and summing across institutions.

The estimates of the number of awards and the total dollar amount of these awards are contained in Tables B.1 and B.2. For comparison, the tables also contain the "true" 1991–92 LEEA numbers.

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[1]This formula derives from the Pell grant formula which for students in Category 2 is Pell = 2350 – [PGI].

[2]The maximum PGI for a student in Category 3 is DC – 200, the minimum is 2200. The average of the maximum and minimum gaps is [(DC – 2200) + [DC – (DC – 200)]]/2 = (DC – 2000)/2.

Table B.1

Number of LEEA Dollars and Awards Offered to Students for the 1991–92 School Year and the Number That Would Have Been Offered If the LEEA Program Used PGI in Measuring Need: Public Schools

	Amount of LEEAs, $		Number of LEEAs	
	Actual	If PGI	Actual	If PGI
Four-year colleges				
Purdue University Main Campus	1,440,175	496,547	2,045	1,043
Ball State University	1,288,632	501,275	1,909	1,077
Indiana University at Bloomington	1,169,131	469,238	1,712	918
Indiana University-Purdue University at Indianapolis	959,885	346,505	1,323	777
Indiana State University	648,443	238,865	953	506
Indiana University-Purdue University at Fort Wayne	577,657	151,695	725	369
Indiana University Southeast	340,525	98,724	433	240
Purdue University Calumet	338,087	100,391	429	244
University Southern Indiana	332,859	101,946	482	280
Indiana University at South Bend	262,848	96,449	375	249
Indiana University Northwest	203,678	69,242	268	165
Indiana University at Kokomo	137,403	62,567	207	155
Purdue University North Central Campus	119,077	50,950	165	113
Indiana University East	98,670	57,492	159	143
Two-year colleges				
Vincennes University	643,168	201,864	923	524
IV Technical Colleges				
Central Indiana	114,918	47,363	194	174
Northeast	82,642	31,416	144	110
Wabash Valley	65,825	24,437	115	91
Northcentral	57,868	21,929	100	82
Southwest	55,691	18,448	89	69
Lafayette	55,294	20,095	93	74
Eastcentral	51,377	21,160	93	78
Southcentral	46,342	16,942	78	66
Bloomington	37,351	13,706	64	51
Kokomo	29,888	13,352	53	51
Columbus	29,011	10,394	47	39
Whitewater	28,000	16,782	61	64
Gary	25,152	10,706	38	40
Northwest	20,280	11,408	41	42
Southeast	13,968	10,680	33	39
Anderson	10,062	5,468	20	22

Table B-2

Number of LEEA Dollars and Awards Offered to Students for the 1991–92 School Year and the Number That Would Have Been Offered If the LEEA Program Used PGI in Measuring Need: Private Schools

	Amount of LEEAs, $		Number of LEEAs	
	Actual	If PGI	Actual	If PGI
Butler University	515,628	512,637	791	781
University of Evansville	397,909	367,588	794	782
DePauw University	396,412	407,537	378	380
Rose-Hulman Inst. of Tech.	364,612	344,004	503	488
University of Indianapolis	349,589	322,505	925	923
University of Notre Dame	331,464	354,728	280	288
Valparaiso University	260,082	236,869	482	456
Wabash College	196,888	200,687	283	273
Earlham College	175,030	184,740	144	148
Franklin College of Indiana	149,410	119,234	421	421
Manchester College	148,637	137,258	473	467
Taylor University	136,273	123,548	291	276
Anderson University	136,144	142,265	512	524
Saint Joseph's College	116,114	114,205	288	291
Indiana Wesleyan University	94,632	104,883	419	439
Marian College	91,320	104,197	409	433
Saint Mary's College	86,107	89,611	141	141
Tri-State University	83,762	77,728	283	283
Oakland City College	77,478	83,953	371	378
Saint Mary-of-the-Woods College	61,356	61,935	190	191
Bethel College	60,819	65,138	256	267
Martin University	56,348	58,739	278	283
Saint Francis College	55,558	45,779	245	245
Goshen College	47,528	38,462	175	159
Huntington College	44,092	40,727	154	155
Hanover College	40,550	55,496	197	224
Grace College	36,800	39,417	147	160
Summit Christian College	26,915	29,475	129	131
Calumet College of Saint Joseph	23,596	18,640	93	84
Indiana Institute of Technology	22,750	22,641	100	99
Holy Cross College[a]	21,583	9,498	70	50
St. Elizabeth Hospital School of Nursing[b]	19,810	19,612	95	92
Lutheran Col. of Health Prof.[b]	16,346	10,797	58	47
Ancilla College[a]	9,903	3,734	23	15
Saint Meinrad College	1,478	1,307	7	7
Contract for Space				
University of N. Kentucky	15,130	2,528	26	26
University of Cincinnati	7,412	1,775	12	4
Cincinnati Technical College	5,173	2,281	9	6

[a]Two-year school.

[b]Two- to four-year school.

Appendix C

ESTIMATING THE EFFECTS OF VARIOUS FACTORS ON THE 1991–92 INCREASE IN THE LEEA PROGRAM

The size of the LEEA program increased substantially between the 1990–91 and 1991–92 academic years. In 1990–91, the program provided more than 16,500 grants, amounting to about $8.3 million. In 1991–92, the LEEA program offered nearly 24,000 awards, amounting to almost $14.0 million. If the utilization rate seen in prior years of about 75 percent holds in 1991–92, the LEEA program will provide about 18,000 awards, totaling about $10.5 million. This is a 25 percent increase over the prior year.

Numerous factors might have caused this increase:

- Educational costs increased.
- More students applied for LEEA awards.
- The State aid program had to cut back on the sizes of its grants.
- The recession reduced families' incomes and assets and consequently, expected parental contributions.
- The distribution of LEEA recipients among institutions varied from past patterns.

We analyzed the relative effects of each of these factors on the increase in the costs of the LEEA program. This was done by sequentially assuming that each factor had stayed at its 1990–91 level while the others changed and computing what students' LEEA grants would have been. Each of these computations is an estimate of what 1991–92 LEEA awards would have been if the specified factor had stayed at its 1990–91 level while all other factors took on their 1991–92 values. The differences between each of these computations and the actual 1991–92 LEEA awards is an estimate of how the change in the specified factor affected the LEEA program.

For example, the surge of applications for State grants in 1991–92 forced the State Student Assistance Commission to reduce the adjustment factor from the 0.77 level of prior years to 0.63. Con-

sequently, State grants were smaller and the gap between the target cost of attendance and a student's Pell and State grants and PC was larger than would have been the case if the state had been able to maintain the 0.77 factor. To estimate the effects of this change on the LEEA program, we recomputed what each 1991–92 LEEA recipient's State grant would have been if the 0.77 factor had been used. We then calculated what each student's 1991–92 LEEA award would have been if the recomputed State grant had been awarded. The difference between the LEEA actually offered a student and the award that would have been offered had the 0.77 factor been used to determine the State grant is the amount of additional funds the LEEA program had to offer in 1991–92 because of the change in the State grant adjustment factor, everything else equal.

Similarly, we computed what LEEA award offers would have been had the number of 1991–92 applicants been the same as the 1990–91 number, everything else equal—assuming the 0.63 state adjustment factor and so on. The difference between these estimated LEEA award offers and the actual LEEA offers is the amount of additional funds the LEEA program had to offer because of the increase in applications for aid between 1990–91 and 1991–92, everything else equal. We performed similar calculations, sequentially assuming 1990–91 educational costs instead of actual 1991–92 costs, 1990–91 PCs instead of actual 1991–92 PCs, and the 1990–91 distribution of students among institutions instead of the actual 1991–92 distribution. In each case we obtained an estimate of the effects of the 1990–91 to 1991–92 change in the factor examined on the change in the costs of the LEEA program between 1990–91 and 1991–92.

The changes in the LEEA program attributable to changes in costs were estimated by recalculating each student's LEEA and State awards using the 1990–91 cost of attendance at the student's institution rather than the 1991–92 cost of attendance.

To estimate the effects of changes in parental contribution, each student's LEEA award was recalculated using an estimate of the student's 1990–91 parental contribution. Each student's actual 1990–91 parental contribution was multiplied by the ratio of the mean 1990–91 parental contribution at that student's institution to the mean 1991–92 parental contribution at that institution.

To estimate the effect of the increase in the number of awards, we multiplied the average LEEA at each institution by the ratio of the number of LEEA recipients at the institution in 1990–91 to the corresponding number for 1991–92. Changes to the entire program were found by summing the individual institutional changes.

Because the dollar amount of the LEEA depends on the gap between costs and support, all other things being equal, students attending higher-priced schools will receive larger LEEAs. Thus, the distribution of students across the various institutions affects the total cost of the LEEA program. To measure this effect, we redistributed the 1991–92 LEEA awards according to the 1990–91 award distribution. The actual calculations were as follows: For a given institution, the number of awards granted to students attending this institution in 1990–91 was divided by the total number of awards granted in 1990–91. The total number of awards granted in 1991–92 was multiplied by this factor, yielding an estimate of the number of 1991–92 LEEA recipients for this institution. The dollar amount of aid was found by multiplying the estimated number of recipients by the institution's 1991–92 mean award. To determine the effect on the entire LEEA program, the estimates from the individual institutions were summed.

Taken together, these calculations indicate the degree to which each factor contributed to the increase in LEEA award offers from 1990–91 to 1991–92. We scaled the separate estimates so they would sum to 1. The results are presented in Table C.1.

Table C.1

Sources of the 1991–92 Increase in LEEA Awards

Factor	Actual LEEA $	Estimated LEEA $	Difference	Percent of Total Difference
Cost	13,964,545	12,682,828	1,281,717	14.27
Parental contribution	13,964,545	12,597,624	1,366,921	15.23
State aid	13,964,545	11,199,461	2,765,084	30.77
Applications	13,964,545	9,972,467	3,992,078	44.45
Distribution	13,964,545	14,388,836	–424,291	–4.72
Total			8,981,509	100.00

Appendix D

THE EFFECTS OF LEEA AWARDS ON GIFT-AID, BY INSTITUTION

Most of the colleges and universities in Indiana ascribe to the financial-aid policy commonly referred to as equity funding. According to this policy, the institution's financial-aid officers use institutional discretionary funds to create equity in the financial burdens that educational costs place on students. Such a policy can remove the differential effects of the size of individual LEEAs. At the extreme, the LEEA program behaves like a transfer from the Lilly Endowment to the institutions. The LEEA money increases the pool of the institutional aid and every student receiving institutional aid receives an equal share of this increase.

Given that institutions tend to equalize gift-aid, the effective size of a LEEA is the actual increase in aid after adjusting for the effects of equity funding. The extreme case described above minimizes the effective size of the LEEAs. We calculated the minimum effective size of the LEEAs at the various colleges and universities. The calculations were performed by dividing the total dollar amount received by LEEA recipients attending an institution by the total number of gift-aid recipients at that institution (including those who received non-LEEA gift-aid). The results are given in Tables D.1 and D.2. Because of data limitations, calculations at some private schools could not be performed.

Table D.1

Estimated Average Reduction in Total Gift-Aid per Gift-Aid Recipient of Removing LEEAs from the Total Gift-Aid Package: Public Schools

Two- and four-year colleges	
Rose-Hulman Institute of Technology	$348
Huntington College	206
DePauw University	205
Wabash College	181
Butler University	147
University of Notre Dame	133
Earlham College	126
University of Evansville	122
University of Indianapolis	120
Saint Joseph's College	109
Oakland City College	100
Manchester College	80
Bethel College	77
Tri-State University	59
Calumet College of Saint Joseph	56
Anderson University	45
Hanover College	44
Goshen College	29
Indiana Institute of Technology	24
Saint Meinrad College	10
Ancilla College	—
Franklin College of Indiana	—
Grace College	—
Holy Cross College	—
Indiana Wesleyan University	—
Lutheran College of Health Professions	—
Marian College	—
Martin University	—
Saint Francis College	—
Saint Mary-of-the-Woods College	—
Saint Mary's College	—
Summit Christian College	—
Taylor University	—
Valparaiso University	—
Contract for space	
Cincinnati Technical College	—
University of Northern Kentucky	—
University of Cincinnati	—

— No data available.

Table D.2

Estimated Average Reduction in Total Gift-Aid per Gift-Aid Recipient of Removing LEEAs from the Total Gift-Aid Package: Private Schools

Four-year colleges	
Purdue University Calumet	$500
Indiana University-Purdue University at Fort Wayne	335
Purdue University North Central Campus	303
Purdue University Main Campus	226
Ball State University	212
Indiana University Northwest	197
Indiana University Southeast	181
Indiana State University	178
Indiana University at South Bend	166
Indiana Univesity at Bloomington	159
Indian University East	158
University Southern Indiana	148
Indiana University-Purdue University at Indianapolis	146
Indiana University at Kokomo	126
Two-year colleges	
Vincennes University	333
Indiana Vocational Technical Colleges:	
Lafayette	49
Columbus	43
Southcentral	42
Whitewater	38
Wabash Valley	38
Central Indiana	37
Northcentral	37
Southeast	33
Northeast	29
Eastcentral	23
Southwest	20
Northwest	20
Kokomo	10

Appendix E
COLLEGE PARTICIPATION IN INDIANA

This appendix reviews the trends in college participation in Indiana as measured by the index adopted by the Indiana Commission for Higher Education. We then discuss some limitations of that index.

ONE VIEW OF COLLEGE PARTICIPATION IN INDIANA

In 1986, the Indiana Commission for Higher Education staff reviewed alternative approaches to measuring college participation and proposed the index:[1]

$$\text{Index} = \frac{\text{Fall undergraduate college enrollments}}{\text{Resident state population aged } 18-24}$$

Table E.1 presents the college participation rate for Indiana, as measured by this index, for alternative years during the 1980s. The table also shows the corresponding rates for the nation as a whole and for the four states that border Indiana. The last column in Table E.1 shows where Indiana participation ranks among the 50 states on this index.

By this measure, college participation in Indiana has consistently fallen well behind other states. Indiana's participation rate consis-

Table E.1

College Participation in Indiana and in Other States

	Participation Rate (%)			
Year	Indiana	National Average	Bordering States[a]	Indiana's Rank
1980	27	31	30	36
1982	31	36	34	40
1984	31	36	35	40
1986	33	39	38	40
1988	37	42	41	39

SOURCE: State of Indiana (1990).

[a]Bordering states: Kentucky, Illinois, Michigan, and Ohio.

[1]State of Indiana (1986).

tently increased over the decade. But college participation rates increased everywhere else as well. At the beginning of the decade, Indiana's rate was about 4 percentage points below the national average; it was nearly 5 percentage points below the national average at the end of the decade. Put another way, Indiana consistently ranked about 40th in the nation in college participation as measured by this index. Other states' participation rates apparently grew as fast as did Indiana's, leaving the state in the same relative position at the end of the decade as it had been at the beginning.

Furthermore, Indiana's lagging performance cannot be attributed to some regional phenomena. Indiana's neighbors' college participation rates approximated the national rate at the outset of the decade and grew with the national rate throughout the 1980s.

It appears that the increase in Indiana's college participation rate is simply a reflection of the factors that contributed to increases in college participation across the nation. These data offer no evidence that Indiana has been able to make up any of its deficiency, relative to other states, over the 1980s.

LIMITATIONS OF THE INDEX

The Higher Education Commission staff considered several alternative strategies for developing a participation measure. They opted for the selected index because "the selected calculation is simple, easy to duplicate, recognizes the changing size of the education target group, depends on easily obtainable data, and has approximately the same meaning from state to state . . . ."[2] They note that the measure does not properly capture interstate migration, but they argue that other methods are equally deficient.

The criteria used to select the index are unquestionably important concerns. However, the degree to which the index appropriately measures the phenomena of interest is an even greater concern. The index adopted by the Commission for Higher Education includes several diverse populations and omits at least one relevant population. By mixing together these diverse populations, the index masks differences among their enrollment trends and patterns. In particular, it may fail to accurately portray participation by the population of primary interest—18–24 year old Indiana residents.

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[2]State of Indiana (1990), p. 4.

The denominator in the index—the resident state population aged 18–24—is well defined. This is the population of primary interest. The question is, what fraction of this population is participating in postsecondary education?

The index's numerator—Fall undergraduate enrollment in the state—includes three different populations:

- Indiana resident undergraduates aged 18–24.
- Indiana resident undergraduates 25 years old or older.
- Nonresident undergraduates.

The numerator does not include Indiana residents aged 18–24 attending out-of-state postsecondary institutions.

Differences in the enrollment patterns of these separate groups relative to trends in other states, over time, will affect the comparisons and obscure what is happening to 18–24 year old Indiana residents' participation. For example, suppose nonresident 18–24 year olds or students 25 or more years old accounted for a larger fraction of undergraduates in Indiana than in some other state (or group of states). The Indiana index would be correspondingly higher, relative to the other state's index, even if there was no difference between Indiana and the other state in participation by resident 18–24 year olds. Similarly, changes over time in the nonresident fraction of undergraduates, in the fraction of undergraduates who are 25 or older, or in the rate at which Indiana 18–24 year old undergraduates choose out-of-state rather than in-state institutions will affect the value of the index even if there is no change in the 18–24 year old population's college participation.

These concerns may be minor in the sense that their effects on the index are small enough to disregard. But they have to be examined before they can be dismissed.

MIGRATION PATTERNS IN INDIANA HIGHER EDUCATION

In 1979, and then biannually since 1982, the National Center for Educational Statistics surveyed colleges and universities to determine

first-time students' residence and migration.[3] Table E.2 shows how Indiana compares to the other states in terms of the annual net inflows of first-time undergraduates. It presents Indiana's ranking among the 50 states in terms of the number of students entering the state as first-time undergraduates minus the number of students leaving the state to enroll as first-time undergraduates elsewhere. The rankings are available for three categories of first-time undergraduates: (1) Recent high school graduates are students enrolling in higher education within 12 months of graduating from high school; (2) first-time freshmen are all entering freshmen, including both recent high school graduates and students who deferred enrolling in college for a year or more after graduating from high school; and (3) transfers, including all students enrolling at any undergraduate level above freshman.

Indiana is a major importer of first-time undergraduates. When states are ranked in order of the difference between the inflow of first-time undergraduates from other states and the outflow of residents to colleges and universities in other states, Indiana consistently ranks near the top. Throughout the past decade, Indiana has ranked in the top 10 states in the net inflow of freshmen and nearly that high in the net inflow of undergraduates transferring from other institutions.

Recall that the Commission for Higher Education index for any state includes its nonresident undergraduates and omits the students who leave the state to go elsewhere. Thus, the index overstates participation in a state to the extent that the flow of nonresident students into the state exceeds the flow of residents to out-of-state institutions. The data presented in Table E.2 suggest that the overstatement is potentially greater for Indiana than for most other states.

Table E.2

Indiana's Ranking on Net Inflow of First-Time Undergraduates

	Recent High School Graduates	First-Time Freshmen	Transfers
1979	NA	8	12
1982	NA	6	9
1984	5	7	9
1986	6	9	10
1988	3	9	12

SOURCE: U.S. Department of Education (various years).

[3]U.S. Department of Education (various years). First-time students are defined as all students enrolled at the reporting institution for the first time.

The data presented in Table E.3 offer a somewhat different perspective on the potential effect of student migration on the index. It shows how Indiana ranks among the states in terms of the share of all first-time undergraduate students who are nonresidents. Indiana consistently ranks among the top third of all states on the fraction of new undergraduates who come from out of state. Because the Commission for Higher Education index does not distinguish between resident and nonresident undergraduates, it overstates residents' participation to the degree that undergraduates are nonresidents. Thus, the degree to which the index overstates resident participation will tend to be greater in Indiana than in two-thirds of the other states.

The value of the index for any state does not reflect the 18–24 year olds who go on to college in some other state. It thus undercounts participation by a state's 18–24 year olds to the degree that they enroll in out-of-state institutions. Table E.4 shows Indiana's ranking among the states in terms of the share of all the first-time undergraduate students from a state who enroll at an in-state institution. In other words, these data show how Indiana ranks in terms of the rate at which first-time undergraduate students "stay home."

Indiana consistently ranks in, or near, the top third of states in terms of the tendency of first-time undergraduates to enroll at an in-state institution. Consequently, the degree to which the participation index undercounts participation by omitting students going out of state will tend to be less in Indiana than in about two-thirds of the states.

The National Center for Educational Statistics collects residence and migration data only for first-time students. The effects of first-time students' migration patterns will depend on the extent to which they continue at an institution. If nonresidents persist beyond initially entering an institution at the same rate as do residents, the distribution

Table E.3

Indiana's Ranking on Nonresident Share of First-Time Undergraduates

	Recent High School Graduates	First-Time Freshmen	Transfers
1979	NA	12	15
1982	NA	18	20
1984	14	16	16
1986	18	13	13
1988	13	15	13

SOURCE: U.S. Department of Education (various years).

Table E.4

***Indiana's Ranking on Share of First-Time* Undergraduates Who Enter an In-State Institution**

	Recent High School Graduates	First-Time Freshmen	Transfers
1979	NA	21	22
1981	NA	16	17
1984	15	15	17
1986	15	17	18
1988	10	16	16

SOURCE: U.S. Department of Education (various years).

of all undergraduates, both first-time students and those continuing, will be the same as the distribution of first-time students.

Data on the fraction of all undergraduates who are residents of a state are not generally available. However, for Indiana, the data available from the Commission for Higher Education Student Information System are sufficient to calculate the resident share of undergraduate enrollments in Indiana institutions for both first-time students and continuing students. Table E.5 provides these results through 1989, the most recent year for which the data are available.

About 80 percent of first-time students entering Indiana each year are residents; about 20 percent of the new entrants come from other states. Similarly, Indiana residents account for about 80 percent of the continuing students—students who enroll at an institution they previously attended. It is clear that nonresidents are as likely to continue as are residents. It follows that, for Indiana, the migration patterns noted above are reflected in the total population of undergraduates. And, if other states' resident and nonresident undergraduate populations also tend to continue at approximately the same

Table E.5

Resident Share of Indiana Undergraduates

	Indiana Residents/Enrollment, %		
	First-Time Students	Continuing Freshmen	Transfer Students
1986	81	80	82
1987	80	81	82
1988	78	80	81
1989	81	79	81

SOURCE: Computed from the Indiana Commission for Higher Education Student Information System.

rate, the resident share of their undergraduate populations will similarly reflect their migration experience.

In sum, the net inflow of undergraduates into Indiana tends to be greater in both absolute numbers and as a fraction of all first-time undergraduates than for most other states. And the likelihood that a student will continue at an institution appears to be independent of residency status. It follows that nonresidents are a larger fraction of undergraduates in Indiana than in most other states. Because the Commission for Higher Education index does not distinguish between residents and nonresidents, it will tend to be biased upward in Indiana, relative to other states. At the same time, compared to other states, Indiana tends to lose relatively fewer students to out-of-state institutions. Because these losses are relatively less significant for Indiana than for other states, the resulting tendency to undercount participation by a state's 18–24 year olds will be less severe in Indiana than in other states. Taken together, these patterns suggest that the index tends to be biased in Indiana's favor.

AGE PATTERNS IN INDIANA HIGHER EDUCATION

Table E.6 shows the proportion of undergraduates aged 18–24 in Indiana and in the nation as a whole.[4]

Table E.6

Proportion of Undergraduates Aged 18–24

Year	Indiana	U. S.
1980	NA	75
1982	NA	74
1984	NA	72
1986	67	69
1987	67	71
1988	67	70
1989	66	NA

SOURCES: Indiana proportions computed from the Indiana Commission on Higher Education Student Information System. U.S. proportions computed from U.S. Department of Commerce, *Current Population Reports* (various years).

[4]Data on the age distribution of undergraduates are not readily available for other states.

The Commission for Higher Education participation index includes all undergraduates, regardless of age, in the numerator. Accordingly, it overstates participation by 18–24 year olds to the extent that undergraduates are aged 25 or older. The magnitude of this overstatement is greater as the share of undergraduates aged 25 or older is larger. The data presented in Table E.6 indicate that the extent of overstatement in Indiana is greater than in most other states.

However, these data also show that the share of undergraduates who are aged 25 or older is growing nationally, but not in Indiana. This suggests that the overstatement resulting from including older students in the index is declining in Indiana relative to the nation as a whole. Thus the index both overstates participation in Indiana compared to other states and obscures improvements in Indiana's participation relative to other states over time.

Appendix F

THE EFFECTS OF STUDENT FINANCIAL AID ON COLLEGE GOING: A LITERATURE REVIEW

One stated goal of the LEEA program is to increase enrollment of Indiana students in postsecondary education. A large body of literature exists on the effects of various aid programs on access to education. This literature is useful for developing expectations about the effects of the LEEA program. Therefore, a summary of this literature follows.

APPROACHES TO STUDYING AID

For an aid program to improve access or increase enrollment, the program must enable or encourage academically able but financially disadvantaged students, who would not participate without the existence of the program, to engage in postsecondary education. The complexity of the enrollment decision makes distinguishing an individual aid program's effect on enrollment difficult. Unable to replay history, the analyst must determine how the existence of an aid program influenced student enrollment behavior, given that the enrollment decision is controlled by a myriad of factors. The literature offers several approaches for completing this onerous task.

The conceptually simplest approach is to ask students about the effect of an aid program on their enrollment decision. This yields a direct response to the question of interest. This method was used by Fife and Leslie (1976) and Fenske, Boyd, and Maxey (1979). These studies, however, have their limitations. Surveys measure student perception of aid's importance, not true student behavior. Furthermore, students have a vested interest in the continuation and expansion of all aid programs and could tend to overstate the importance of aid.

Another conceptually simple approach to analyzing an aid program's effect on access is to compare enrollment patterns for years before the inauguration of an aid program, to enrollment patterns for years after its inception. This approach was taken by Tierney (1982), Hansen (1983), and McPherson and Schapiro (1991a, 1991b). The shortcomings of this approach derive from the use of aggregated enrollment data and the analysts inability to control for either yearly fluctuations or longer-term trends in factors that influence enrollment patterns but are unrelated to aid.

A third approach to assessing an aid program's influence on access is through econometric modeling. Both aid-related variables and other covariates are included in these models for determining enrollment. The inclusion of all relevant covariates enables the analyst to distinguish the effects of an aid program from all other influences on enrollment. Typically, cross-sectional data are used to estimate the parameters of the model and the effect of the aid program is determined by the parameter estimates. Examples of econometric studies include Blakemore and Low (1983, 1985), Carroll et al. (1977), Manski and Wise (1983), and Schwartz (1985).

Although econometric models offer the researcher greatest control, they also pose difficult problems. Unbiased estimation of the effect of financial aid on enrollment requires knowledge of the response to changes in aid of people currently not enrolled in postsecondary education. Studies in the literature have taken three approaches to resolving this problem.

Some studies have measured aid's influence on enrollment by measuring aid's influence only on the applicants' decision to enroll in some form of postsecondary education. This was the approach taken by Jackson (1978), Berne (1980), and St. John and Noell (1989). This approach ignores the possibility that changes in aid may affect the prospective student's decision to apply as well as the applicant's decision to matriculate. The advantage to this approach is that the analyst is not required to impute aid offers and college choice sets for people who did not apply to any colleges or universities.

To avoid imputing college selection choices for prospective students who were not enrolled, some authors (Schwartz, 1985, for example) assign each prospective student a single educational choice and impute the expected financial aid a student will receive at this institution. The expected aid is then used in the model to determine aid's effect on enrollment.

Schwartz (1985) assumed that all prospective students chose between attending the nearest home-state four-year university or not engaging in postsecondary education. He argued that students who would not attend the nearest home-state university, the cheapest four-year alternative, could not be expected to pay the premium to attend elsewhere. He used the data on students attending home-state four-year universities in the 1982 High School and Beyond data, HSB, to develop a model for predicting any prospective student's expected aid. He then used the entire HSB data set to estimate the parameters of a very well-developed model for determining the probability that an individual student would enroll at the nearest home-state four-year

university. The expected aid for each student was imputed and a student enrolled at any four-year university was assumed to have enrolled at the nearest home-state university. One shortcoming of Schwartz's exceptional study derives from his omission of a correction for selection bias in estimating the parameters of the expected aid model. Students who apply for college may differ systematically from students who do not apply and this could bias the estimated amount of aid for nonapplicants.

Some authors (for example, Radner and Miller, 1970; Kohn, Manski, and Mundel, 1974; Carroll et al., 1977; and Manski and Wise, 1983) developed models for imputing prospective student's choice sets and the expected available aid at each institution in the choice set. The probability that a prospective student chooses to enroll or not at each institution in this choice set is estimated by a model based on the expected aid awards and other characteristics of the institution and the prospective student.

For their model, Radner and Miller (1970) limited each student's educational choices to selecting one of eleven school types. Their model also included a choice of no advanced schooling. They used the 1966 SCOPE data, which did not contain aid information. Therefore, they assigned a fixed cost to each institution type and differences in cost served as a surrogate for changes in aid.

Kohn, Manski, and Mundel (1974), Carroll et al. (1977), and Manski and Wise (1983) considered individual institutions rather than classes of school types. Kohn, Manski, and Mundel and Manski and Wise used techniques developed by McFadden (1974) to estimate the probability that a student chooses to enroll in any particular institution for further education. To facilitate this analysis, they assigned a zero probability to institutions over a certain distance from the student's home. Kohn, Manski, and Mundel used the SCOPE data and were unable to estimate aid awards. They were forced to analyze only the effects of cost. Manski and Wise used the National Longitudinal Study of the High Class of 1982, NLS, and derived a model for estimating expected awards. Manski and Wise accounted for sample selection bias through the inclusion of appropriate terms in their model.

Carroll et al. also used the NLS data but used simpler probability arguments based on Bayes Theorem to estimate enrollment decisions. Their model implicitly corrected selection bias. The effects of aid were measured by the reduction in net costs. Carroll et al. did not explicitly include aid in their final model because changes in aid had

equal and opposite effects to changes in costs. To measure the effect of an aid program required imputing each student's award for all schools within a given distance from the student's home. From the imputations the net cost of each school was derived.

Blakemore and Low (1983, 1985) used a slight modification of this approach. They developed a model to predict the probability that a prospective student will receive financial aid when enrolling at some institution of higher learning. Using this estimated probability and other student characteristics, they modeled the probability that a student will enroll in postsecondary education. They used NLS data for their study and used applicant data to estimate the parameters of their aid-prediction model. Blakemore and Low used methods developed by Heckman (1976) to correct for sample selection bias in the estimation of the aid-prediction model.

Using the probability of receiving aid rather than the amount of aid to measure the aid's influence on enrollment eliminated the need for the authors to impute college choice sets and aid offers, but this approach is not altogether satisfactory. The authors justified their choice by stating that they were "ultimately attempting to evaluate how the availability of scholarship aid influences the enrollment decision" (Blakemore and Low, 1983, p. 506). They tacitly assumed a narrow definition of "availability of scholarship aid," which ignores the amount of aid. It is difficult to believe that enrollment decisions are based solely on the accessibility of aid and not on the amount of aid. An aid program that only increases the dollar amount of aid granted to students already receiving aid does not increase the accessibility of aid. Are we to conclude that such a program has no effect on aid? It appears that this approach to econometric modeling could understate the effects of an aid program and offers no useful information for calibrating the effect of a given dollar amount of aid.

Blakemore and Low were not the only authors to limit their study to the effects of access to aid rather than the amount of aid. St. John and Noell (1989) analyzed the effect of the presence or absence of a particular type of aid in a student's aid package. Although not stated by the authors, this analysis also assumed that only the accessibility of aid influences enrollment. This assumption was especially problematic in their study because one of the aid programs they evaluated was the federal subsidized loan program. One can easily imagine that the prospect of a large or a small loan burden would have a different effect on a student's enrollment decision.

RESULTS OF THE DEMAND STUDIES

Not all the literature that pertains to access actually studied financial aid. Access literature forms two basic groups, demand studies and aid studies. Demand studies follow a traditional economic format. Postsecondary education is viewed as good purchased by students. The cost of this education less aid is considered the price of the good. Educational costs include tuition, room and board, travel expenses, and books. Financial aid includes federal, state, institutional, and private grants; scholarships; work study; and loan subsidies. Based on this price, the demand curve is then estimated. That is, the expected changes in enrollment created by changes in net cost are calculated. Most of these studies do not differentiate between increases in aid and decreases in tuition or other costs. Aid studies, on the other hand, directly analyze enrollment changes as caused by changes in aid programs.

Financial aid reduces educational costs for students who receive it. Therefore, the results of the demand studies may be applicable to studies of financial aid's influence on enrollment. Results from these studies are summarized below.

Several excellent reviews of the student demand and aid literature exist. Leslie and Brinkman (1987, 1988) provide a concise review of student demand literature. They distilled from each of a wide variety of econometric cross-sectional studies a single measure of the change in the enrollment rate, the SPRC. SPRC is the percentage point change in the enrollment rate for all 18–24 year olds, per $100 (1982 dollars) increase in the 1982–83 average cost of tuition, and room and board. The parameters from these 25 studies were then combined to give a consensus estimate. Leslie and Brinkman estimated that a $100 increase in net cost will cause a decline of 0.7 percentage points in the national aggregated enrollment rate for first-time students. This represents about 2.1 percent decline in the 1982 enrollment rate of approximately 33 percent.

The limitations to using demand studies for estimating the effects of aid must also be considered. Equal changes in costs and aid do not necessarily cause equal changes in enrollment (Blakemore and Low, 1985; Leslie and Brinkman, 1988; and Schwartz, 1985). In fact, not all types of aid have equal effects on enrollment (Schwartz, 1985; and St. John and Noell, 1989), and in one study Schwartz (1985) found that most types of aid had no effect on enrollment. Furthermore, not all students are average. All studies that have discriminated between income classes and ability classes have found that students of different ability and income levels respond differently to changes in cost

and aid. Students with the lowest ability from the most financially disadvantaged families are most responsive to changes in cost and aid (Baird, 1984; Blakemore and Low, 1983, 1985; Jackson, 1978; Carroll et al., 1977; Manski and Wise, 1983; McPherson and Schapiro, 1991b; and Mullen, 1982).

The student demand studies overwhelmingly support the hypothesis that, on the whole, students respond negatively and nontrivially to increases in the net cost of postsecondary education; but caution is needed when these studies are used to draw more specific conclusions about the effects of aid packages.

RESULTS FROM THE AID STUDIES

A cohesive picture of the effects of aid on student access arises from the econometric cross-sectional studies. Furthermore, results from many, but not all, other studies support the findings of these econometric studies. The two most fundamental conclusions are: (1) The availability of student aid promotes greater access; and (2) aid has the greatest influence on low-income enrollment. That is, some students currently enrolled in postsecondary education would not be enrolled if financial aid was inaccessible or less widely available, and many of these students would come from low-income families (Berne, 1980; Blakemore and Low, 1983, 1985; Carroll et al., 1977; Fife and Leslie, 1976; Jackson, 1978; Leslie and Brinkman, 1988; Manski and Wise, 1983; Mortenson, 1987; Mullen, 1982; Schwartz, 1985; St. John and Noell, 1989; Zollinger, 1984). See Leslie and Brinkman (1988) for further studies that reached similar conclusions.

The percentage of enrollments that are aid dependent is less clear. Leslie and Brinkman (1988) combined the results from Berne (1980), Blakemore and Low (1985), Carlson (1975), Carroll et al. (1977), Crawford (1966), Jackson (1978), and Manski and Wise (1983) and found that on average 32 percent of low-income students, 13 percent of middle-income students, and 3 percent of high-income students would not enroll in postsecondary education without grant aid. The estimates from the individual studies, however, vary greatly. The values range from 20 to 40 percent for low-income students, 7 to 20 percent for middle-income students, and 2.4 to 3.5 percent for high-income students.

Furthermore, six of these studies (Blakemore and Low, 1985; Carlson, 1975; Carroll et al., 1977; Crawford, 1966; Jackson, 1978; and Manski and Wise, 1983) used data that pre-date the Pell Grant Program and other major sources of need-based aid. In these studies, the parame-

ters of the models were fit using data on students who did not receive need-based aid. The models were then used in simulations to predict the effects of need-based aid. The results reported in Leslie and Brinkman are either the results of simulations reported in the individual studies or estimates of the change in enrollment caused by a $1,400 reduction in aid. The estimates were done by Leslie and Brinkman using the authors' models and the 1982 average total aid award of $1,400.

Because students targeted for need-based aid differ from those receiving other forms of aid, it is likely that even though these econometric models were exceptionally well developed and theoretically sound, they provide unreliable measures of the percentage of enrollments that can be attributed to aid. Berne's 1980 study used more recent data. The study, however, analyzed the effect of aid only on the enrollment of applicants to two-year colleges.

Two studies not included in the review by Leslie and Brinkman, Schwartz (1985), and St. John and Noell (1989), use HSB data. HSB data collected in 1982 contain information on need-based aid. Schwartz estimated that 22 percent of low-income, 12 percent of middle-income, and 3 percent of high-income enrollment was dependent on aid. As noted previously, Schwartz analyzed enrollment only at four-year colleges. Not only does this ignore the effects on two-year colleges, but it may measure the substitution effect between two- and four-year colleges as well as pure increases in enrollment.

St. John and Noell studied enrollment at both two- and four-year institutions and found that financial aid increases enrollment. However, the percentage of enrollments induced by aid cannot be calculated from their reported results.

The results of the student opinion surveys reviewed in Leslie and Brinkman (1988) concur with the basic conclusions that aid increases enrollment and has the greatest effect on low-income enrollment. On average, the results from Fenske et al. (1979) and Fife and Leslie (1976) indicate that 45 percent of all low-income students and 35 percent of all middle-income students felt that they would not attend without need-based aid. These results are important because they support the claims of the econometric studies. The estimated percentages are of little value. Not only are these studies subject to the previously discussed survey biases, both are representative of select populations. Fife and Leslie surveyed only New Jersey and California students and Fenske et al. conducted surveys in 1976, 1973, 1970, and 1967 but only in Illinois.

Another almost universally supported conclusion is that socioeconomic status, student ability and ambition, high school track and quality, and other demographic and taste characteristics of the student have at least as great and often greater effects on student enrollment decisions. See Berne (1980), Blakemore and Low (1983), Carroll et al. (1977), Jackson (1978), Manski and Wise (1983), Schwartz (1985), and St. John and Noell (1989) for unique sets of covariates used in each econometric model. Of course, this is not a surprising result. As Leslie and Brinkman (1988, p. 136) stated, "It would be surprising, would it not, if nothing more than a reduction in the net price of attendance could overcome years of relative deprivation of many kinds experienced by typical low income families?"

Not all research on the effect of aid on access supports these claims. The most widely quoted discerning opinion comes from Hansen's 1983 study. Using the Current Population Survey, CPS, Hansen calculated the average of the enrollment rates for 18–24 year old dependent students for the 1971 and 1972 academic years. These were the two years preceding the installation of the BEOG (or Pell) Grants Program in 1973. He also found the average of the 1978 and 1979 enrollment rates for 18–24 year old dependent students. For each two-year average, he calculated the ratio of the enrollment rate for students from families with below median incomes to students from families with incomes above the median. Hansen held that if need-based financial aid removed the financial barriers impeding low-income enrollment, then the ratio from the later data should exceed the ratio from the earlier data.

Hansen's ratio for 1971 and 1972 was 0.46 and for 1978 and 1979 the ratio was 0.43. From this Hansen concluded that aid had little effect on access. Hansen's method and possibly his conclusion are seriously flawed. He ignored the effects of year-to-year variation and possible trends in enrollment patterns. Also, he did not control for changes in nonfinancial impediments to low-income enrollment. He did not even offer a simple check for obvious irregularities in the years he chose to study. Finally, his choice of using the enrollment rate of 18–24 year old dependent students influenced his conclusion (Leslie and Brinkman, 1988).

Other researchers have looked at participation rates over the same time period and many but not all have contradicted Hansen (Leslie and Brinkman, 1988; McPherson and Schapiro, 1990, 1991b). The most convincing is McPherson and Schapiro's 1991 study, which compared the yearly ratio of the low-income enrollment rate to the high-income enrollment rate. They, too, use the enrollment rate for de-

pendent 18–24 year olds. The ratio clearly increases for both black and white students from 1975 until 1980. During the early 1980s, the ratio declined rapidly before leveling off in 1984. Aid for low-income students was most available in the period from 1975 through 1980. Thus, using the complete time series, McPherson and Schapiro found positive correlation between target aid and increased low-income enrollment.

McPherson and Schapiro (1990, 1991a, 1991b), however, also provided some evidence against the effectiveness of aid in improving access. In an analysis of participation rates for 1974 through 1984, they found that the aid coefficients in their models had roughly equal magnitude and opposite sign as the cost coefficients. These are the expected results. A $100 increase in tuition causes a decline in the enrollment rate, which is equivalent to a $100 decrease in available aid. Unfortunately, the coefficients for aid are less precise than those for cost and McPherson and Schapiro could not conclude with any statistical certainty that aid has any true effect at all.

However, several shortcomings exist in this study, which may explain their inability to detect any significant effects of aid on enrollment rates. McPherson and Schapiro analyzed aggregate participation rates. The aid and cost covariates are the average value for an entire subset of the population. Also, they consider only the total subsidy value of an aid package. The model can account for neither individual responses to different aid totals, nor the differential effects of the various aid programs. Individuals do, however, respond differently to various type of aid (Schwartz, 1986; St. John and Noell, 1989). Also, their use of a linear regression model with rate data could have decreased the precision in their estimates, further hampering their ability to detect the effects of aid.

OTHER ASPECTS OF AID'S INFLUENCE ON ENROLLMENT

Consistent with the fact that most enrollments that rely on aid are low income is the fact that low-income and especially low-ability, low-income students are most responsive to changes in aid and or tuition. In fact, many studies find that students from high-income families are unresponsive to aid (Baird, 1984; Carroll et al., 1977; Manski and Wise, 1983; and Schwartz, 1985). Furthermore, high-ability students from families of all incomes are likely to attend college (Baird, 1984; Carroll, 1977; Higgins, 1982; McPherson and Schapiro, 1991b; and Spies, 1978). Thus, the aid received by many high-income and high-ability students is pure subsidy. Aid simply eases the real or per-

ceived burden of educational expenditure for these students who are already guaranteed to enroll.

An implication of these findings is that aid programs designed to improve access must accurately target low-income students. Oddly, as several authors have noted (Manski and Wise, 1983; McPherson and Schapiro, 1990, 1991b; and Mortenson, 1989, 1990), since the late 1970s most federal-aid programs have expanded benefits to middle- and upper-income families at the expense of the lower-income families. Thus, the focus of federal aid has implicitly changed from access to choice, and the availability of aid that truly promotes access has been greatly reduced over the last 10 to 15 years.

The choice a student and his family make on whether or not to enroll in postsecondary education is not actually a single choice but a series of choices (Hearn, 1980; Jackson, 1978; Kohn et al., 1974; Tierney 1980a, 1980b, 1982; Young and Reyes, 1987; Zollinger, 1984). The availability of student aid and knowledge of the availability and approximate value of student aid alter the outcome at each stage of the decision process. The enrollment decision can in general be characterized by the following steps.

1. A preliminary decision is made on whether or not under some conditions postsecondary education would be beneficial (Zollinger, 1984).
2. Contingent on an affirmative response to 1. a choice set of possible schools is selected. Students usually consider schools that historically have accepted students of similar ability (Astin, 1971, Jackson, 1978; Kohn et al., 1974; Manski and Wise, 1983; McPherson and Schapiro, 1991b; and Zollinger 1984). For example, Manski and Wise found that students receive the greatest benefits from attending a college where the average SAT is within 100 points of their own. Also, students consider only those schools they feel are affordable (Jackson, 1978; Kohn et al. 1974).
3. Students apply to a subset of the schools they consider. They often apply to very few schools and many students apply only to one school (Hearn, 1980, Jackson 1978).
4. The student is either accepted or not at the school applied to. Most students are accepted to at least one school and many are accepted at their first choice (Manski and Wise, 1983). As Manski and Wise point out, this does not imply that colleges are unselective. Rather, this appears to indicate that students accurately self-select the college to which they are likely to be accepted. If at least one

school accepts a student, then he decides if the utility from attending the best available college is greater than the utility of not attending college. A substantial proportion of students who are accepted by at least one college eventually enroll (Jackson, 1978). Jackson shows, however, that receiving an aid offer does increase this already high likelihood.

Understanding the enrollment decision as a series of choices accentuates the difficulties associated with using aid to increase access. Although aid may be very effective in ensuring that students who are accepted at some school actually matriculate, this does not guarantee substantial gains in the overall enrollment rate. The opposite is also true: Aid programs with little measurable effect on overall enrollment may greatly increase the probability that accepted students will matriculate (Jackson, 1978). A large number of capable students may never consider continuing their education because they fear the costs are too high. In reality, available aid may make postsecondary education affordable to almost all these students. If the students are unaware of this at the time they decide against continuing their education, then aid can not improve access. Thus, not only is it important for aid to be available but people must know it is there.

Keeping people well informed may be difficult. Studies have shown that decisions on continuing education are made early in a student's academic career, long before the value of aid is known. See Hearn (1980) for a discussion of this research and references. Also, many families are confused about the amount of aid available. In 1980 a large percentage of parents had never even heard of the Pell (or BEOG) Grant Program (Hearn, 1980). McPherson and Schapiro (1991b) showed that in 1987, parents of high-ability students tended to overestimate the cost of exclusive college by 7.2 percent. This was the average for a wide range of incomes. Middle-income parents made even greater overestimates.

IMPLICATIONS FOR LEEA

The consensus of the results from the literature imply that the existence of the LEEA program should have increased enrollment. The increases will tend to be largely from the lowest-income students who receive LEEA grants. Many LEEA recipients, especially the more academically prepared students, would have engaged in some form of postsecondary education regardless of the existence of this program. Depending on how well understood and widely known the LEEA pro-

gram is, enrollment could be increased simply by better informing high school students and their families about LEEA.

Although it would be appealing to use the econometric models from the literature to estimate the LEEA program's effect on enrollment, such calculations would provide little more than nonsense. As noted above, the models yield conflicting measures of the size of the effect of large national-aid programs on access. None of the models account for equity funding, an aid policy of increasing importance in Indiana. Only two models differentiate loans from other sources of aid and none adequately account for the growing reliance of students on loans. Furthermore, even if an acceptable model existed, the data necessary to simulate from a well-developed model do not exist. There are no comprehensive data that include the necessary financial, demographic, academic, and personal records for all prospective Indiana students during the late 1980s and early 1990s.

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